NORTH BRUNSWICK TOWNSHIP
PUBLIC SCHOOL DISTRICT

LINWOOD MIDDLE SCHOOL

25 LINWOOD PLACE
NORTH BRUNSWICK, NJ 08902

FACILITY ENERGY REPORT

TABLE OF CONTENTS

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	Large Power and Lighting Service (LPLS)
Third Party Supplier:	Direct Energy

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	N/A

The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider:	PSE&G		
Rate:	LPLS		
Meter No:	778008541		
Account #	E 42-123-011-05		
Third Party Utility	Direct Energy		
TPS Meter / Acct No:	1151927		
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND KW**	**TOTAL BILL**
Aug-11	150,812	663.0	$27,478
Sep-11	142,861	754.0	$20,993
Oct-11	126,732	562.0	$18,320
Nov-11	128,761	519.0	$13,683
Dec-11	122,669	402.0	$16,012
Jan-12	127,123	402.0	$16,541
Feb-12	131,824	562.0	$17,644
Mar-12	122,031	532.0	$16,406
Apr-12	153,999	588.0	$20,310
May-12	149,412	651.0	$25,540
Jun-12	134,913	410.0	$21,079
Jul-12	132,745	400.0	$20,712
Totals	**1,623,882**	**754.0 Max**	**$234,718**
	AVERAGE DEMAND	**537.1 KW average**	
	AVERAGE RATE	**$0.145 $/kWh**	

Figure 1
Electricity Usage Profile

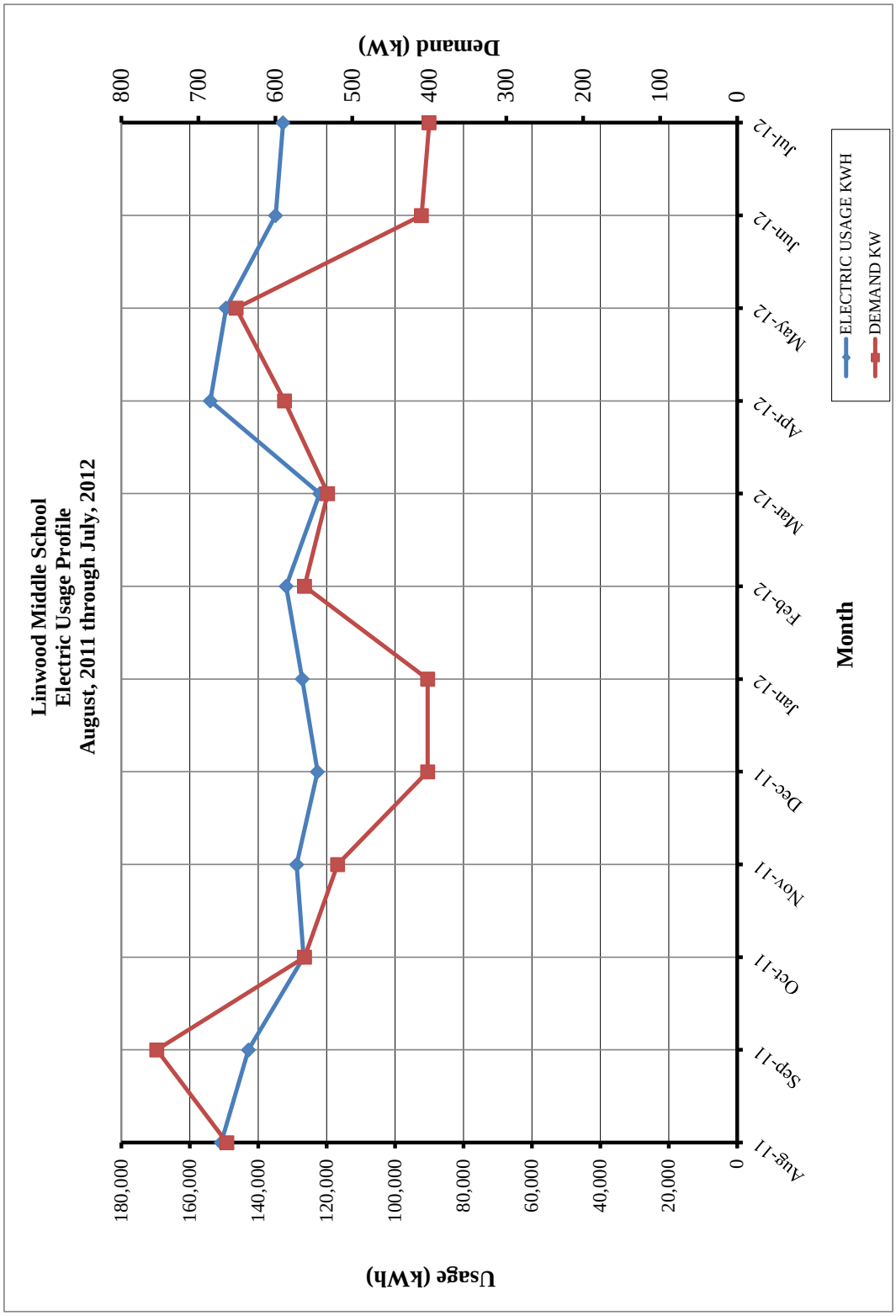
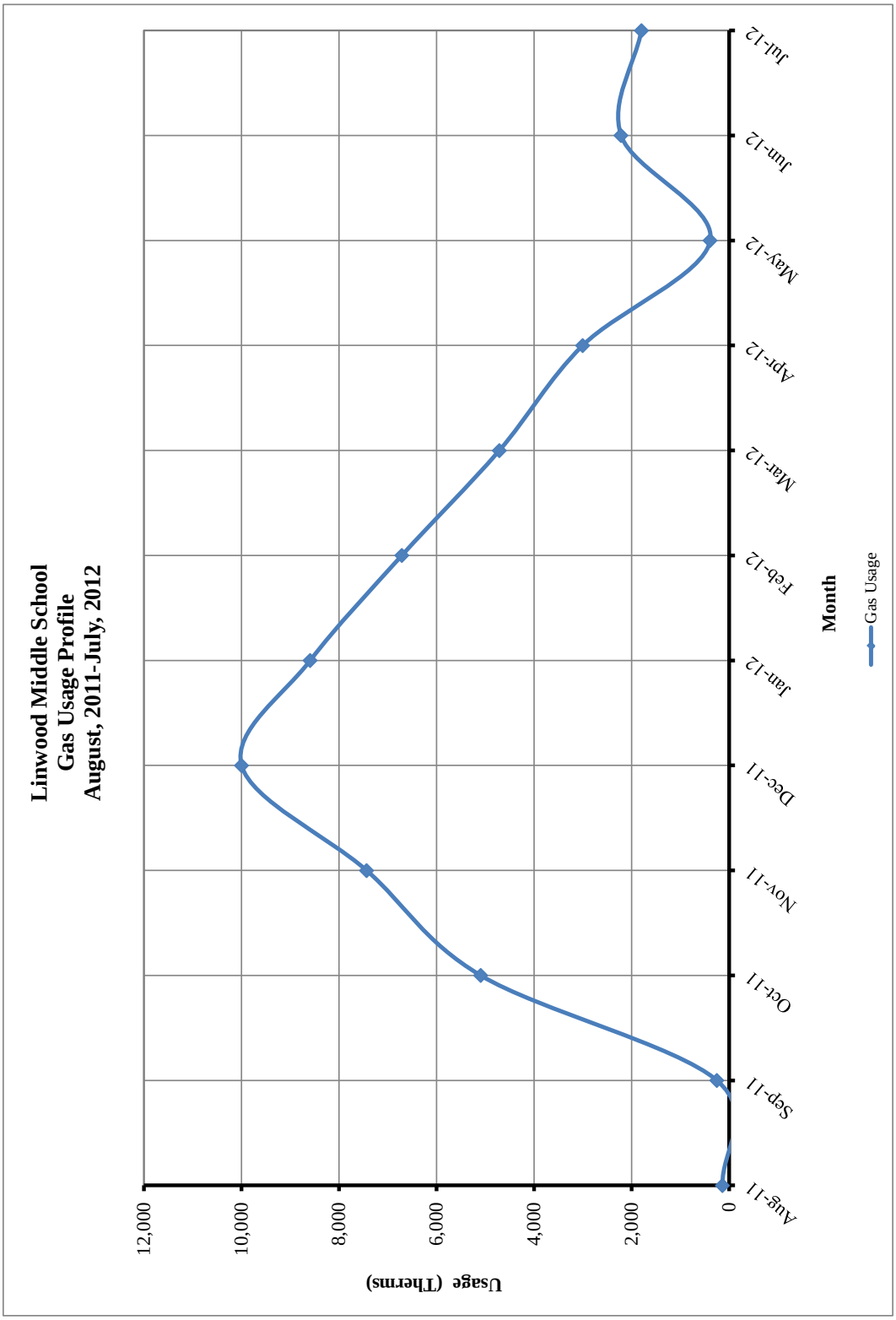


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSE&G	
Rate:	LVG	
Meter No:	1810009	
Point of Delivery ID:	G 42-123-011-05	
Third Party Utility Provider:	N/A	
TPS Meter No:	N/A	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Aug-11	136.00	$206.19
Sep-11	252.00	$291.04
Oct-11	5,096.00	$4,796.49
Nov-11	7,434.00	$6,904.56
Dec-11	9,998.00	$9,066.72
Jan-12	8,591.00	$7,524.85
Feb-12	6,713.00	$5,928.20
Mar-12	4,713.00	$2,852.49
Apr-12	3,005.00	$1,809.25
May-12	390.00	$345.59
Jun-12	2,217.00	$1,536.32
Jul-12	1,799.00	$1,321.09
TOTALS	**50,344.00**	**$42,582.79**
AVERAGE RATE:	**$0.85**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

North Brunswick Township Linwood Middle School is located on 25 Linwood Place in North Brunswick, New Jersey. The school is a total of 204,557 square feet with a 24,635 square foot addition constructed in 2008. The building is a two story building consisting of administrative offices, classrooms, a main gymnasium and auxiliary gymnasium with locker rooms, cafeteria, media center, an auditorium and band room.

Occupancy Profile

The typical hours of operation for the school are Monday through Friday from 7:20 am to 4:00 pm from September through June. In addition, the building has limited occupancy during evening hours for after-school activities. The school's current estimated enrollment is approximately 1,300 students with approximately 120 teachers.

Building Envelope

Exterior walls for the high school are a combination of 4" and 6" brick with a concrete block interior construction. The amount of insulation within the walls is unknown. The windows throughout the school are in good condition and appear to be maintained. Typical windows throughout the school are double pane, ¼" insulated glass with aluminum frames. Blinds are utilized through the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer.

The roof over the original sections of the building is either flat with a brown asphalt shingle covering or a flat, tar roof with a light stone covering. These sections of the roof are in fair condition. The roof over the newest addition is a flat, EPDM rubber roof on steel decking. The amount of insulation below the roofing is unknown, but the roof is in good condition.

HVAC Systems

The original sections of the building are served by a four pipe, hydronic heating and cooling systems. Conditioned air is supplied to the classrooms via indoor, air handling units with chilled water and hot water coils and ducted supply air. Several classrooms are also served by through the wall unit ventilators with chilled water and hot water coils. Hot water is provided to the original building via two (2) Kewanee model firetube boilers rated for 5,321 MBH input with an overall efficiency of 70%. Hot water is circulated throughout the original building loop via two (2) 10-HP base mounted end suction constant speed pumps, each rated for 457 GPM at 110 feet of head. Chilled water is provided to the building loop via a centrifugal, water cooled chillers with two (2) forced draft, closed circuit cooling towers. Chilled water is circulated throughout the building via two (2) base mounted end suction constant speed pumps. One pump has a 25 HP motor and the other a 30 HP motor. The total flow of these pumps could not be confirmed. The chillers and cooling towers are in good condition and are within their useful service life.

The 2008 addition is served by a hot water loop and two (2) packaged rooftop air conditioning units with D/X cooling and hot water heating coils. The boiler plant in the 2008 addition consists of (2) Aerco KC Series boilers, rated for 1,000 MBH each. These boilers are high

efficiency models and are in excellent condition. The hot water is circulated throughout new addition via (2) base mounted end suction pumps with variable frequency drives (VFD). These pumps are each rated for 180 GPM at 80 feet of head.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The exhaust fans are controlled by the occupancy schedule in the BAS.

HVAC System Controls

The HVAC systems within school are controlled by a DDC system by Novar. The DDC system controls the operation, status and temperature set points of the all of the heating and cooling equipment in the facility. Based on conversations with the facility operators, typical cooling set points are 74°F/85°F in occupied/unoccupied modes and heating set points are 70°F/65°F in occupied/unoccupied modes.

Domestic Hot Water

Domestic hot water for the original building is provided by two (2) State model hot water heaters; each with 100 gallons of storage and 275 MBH input capacity. These hot water heaters were installed in 2006 and are in good condition. There is an additional hot water heater located in the 700 wing mechanical room. This is a standard efficiency A.O. Smith gas fired hot water heater with 81 gallons of storage, with an input rating of 154 MBH. The newest addition has an A.O. Smith Cyclone model hot water heater. This hot water heater is a high efficiency, condensing style hot water heater with 60 gallons of storage and having a 120 MBH input rating.

The building is also served by a domestic cold water booster skid, located in the main floor mechanical room. This skid is a SyncroFlow Model 60-5, with two (2) base mounted, end suction constant volume pumps with 5 HP motors rated for 100 GPM.

Lighting

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

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

Table 1
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Upgrade - Gymnasium, Caferia & Exterior	$38,795	$6,336	6.1	145.0%
ECM #2	Lighting Controls	$39,250	$10,491	3.7	300.9%
ECM #3	NEMA Premium Pump Motors	$26,628	$971	27.4	-45.3%
ECM #4	Boiler Replacement	$212,888	$5,658	37.6	-33.6%
ECM #5	Domestic Hot Water Heater Replacement	$31,697	$1,570	20.2	23.8%
ECM #6	VFD on CHW Pumps	$78,600	$6,576	12.0	109.2%
ECM #7	VFD on HW Pumps	$71,400	$4,557	15.7	27.6%
ECM #8	Domestic Water VFD Booster Skid	$22,310	$1,235	18.1	-17.0%
ECM #9	Vending Machine Controls	$537	$869	0.6	2327.4%
ECM #10	Set Computers to Automatic Stand-by or Hibernate Modes	$3,150	$5,640	0.6	2585.7%
ECM #11	Install VFD on Cooling Tower Fan	$15,475	$1,238	12.5	20.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	380.23 KW Solar Array	$2,380,113	$150,091	15.9	-5.4%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

Table 2
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Upgrade - Gymnasium, Caferia & Exterior	15.5	43,699	-
ECM #2	Lighting Controls		81,157	-
ECM #3	NEMA Premium Pump Motors	4.5	6,697	-
ECM #4	Boiler Replacement	-	-	6,657
ECM #5	Domestic Hot Water Heater Replacement	-	-	1,847
ECM #6	VFD on CHW Pumps	-	28,623	-
ECM #7	VFD on HW Pumps	-	31,428	-
ECM #8	Domestic Water VFD Booster Skid	-	10,379	-
ECM #9	Vending Machine Controls	-	5,995	-
ECM #10	Set Computers to Automatic Stand-by or Hibernate Modes	-	38,896	-
ECM #11	Install VFD on Cooling Tower Fan	-	8,538	-
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	380.23 KW Solar Array	308.0	446,589	-

Table 3
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrade - Gymnasium, Caferia & Exterior	$6,336	$38,795	$0	$38,795	6.1
Lighting Controls	$10,491	$42,900	$3,650	$39,250	3.7
~~NEMA Premium Pump Motors~~	~~$971~~	~~$27,258~~	~~$630~~	~~$26,628~~	~~27.4~~
Boiler Replacement	$5,658	$218,888	$6,000	$212,888	37.6
Domestic Hot Water Heater Replacement	$1,570	$32,793	$1,096	$31,697	20.2
~~VFD on CHW Pumps~~	~~$6,576~~	~~$78,600~~	~~$0~~	~~$78,600~~	~~12.0~~
~~VFD on HW Pumps~~	~~$4,557~~	~~$71,400~~	~~$0~~	~~$71,400~~	~~15.7~~
Domestic Water VFD Booster Skid	$1,235	$22,310	$0	$22,310	18.1
Vending Machine Controls	$869	$537	$0	$537	0.6
Set Computers to Automatic Stand-by or Hibernate Modes	$5,640	$3,150	$0	$3,150	0.6
Install VFD on Cooling Tower Fan	$1,238	$15,600	$125	$15,475	12.5
Design / Construction Extras (15%)		*$56,246*		*$56,246*	
Total Project	**$33,037**	**$431,219**	**$10,871**	**$420,348**	**12.7**

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

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade – Gymnasium & Cafeteria

Description:

The gymnasiums at Linwood Middle School are currently lit via 400 watt Metal Halide HID fixtures. The cafeteria is currently lit via 175 watt Metal Halide HID fixtures and the exterior is lit via 100 wall Metal Halides. These areas would be better served with a more efficient, fluorescent lighting system. Concord Engineering recommends upgrading the lighting in the gymnasiums to an energy-efficient T5 high output system that includes new six-lamp, 54 watt high output fixtures. The cafeteria would be retrofitted with a 42 Watt LED retrofit in the existing fixture and the exterior lights would be replaced with 28 wall LED wall-paks.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$38,795
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$38,795
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,336
Total Yearly Savings ($/Yr):	$6,336
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.1
Simple Lifetime ROI	145.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$95,040
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	$36,843.76

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

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

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

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

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

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

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

Energy Savings Calculations:

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

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

Rebates and Incentives:

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

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

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$42,900
NJ Smart Start Equipment Incentive ($):	$3,650
Net Installation Cost ($):	$39,250
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,491
Total Yearly Savings ($/Yr):	$10,491
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.7
Simple Lifetime ROI	300.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$157,365
Internal Rate of Return (IRR)	26%
Net Present Value (NPV)	$85,990.88

ECM #3: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the chilled and hot water pumps are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	**FUNCTION**	**MOTOR HP**	**HOURS OF OPERATION**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**
P-1	Heating Hot Water Pump	10	2,745	90.2%	91.7%
P-2	Heating Hot Water Pump	10	2,745	90.2%	91.7%
P-3	Chilled Water Pump	30	1,600	87.5%	94.1%
P-4	Chilled Water Pump	30	1,600	87.5%	94.1%
P-5	Chilled Water Pump	25	800	88.5%	93.6%

Energy Savings Calculations:
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$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate} \left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	**MOTOR HP**	**LOAD FACTOR**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**	**POWER SAVINGS kW**	**ENERGY SAVINGS kWH**	**COST SAVINGS**
P-1	10	90%	90.2%	91.7%	0.12	336	$49
P-2	10	90%	90.2%	91.7%	0.12	336	$49
P-3	30	90%	87.5%	94.1%	1.61	2,597	$377
P-4	30	90%	87.5%	94.1%	1.61	2,597	$377
P-5	25	90%	88.5%	93.6%	1.03	831	$121
TOTAL					**4.5**	**6,697.4**	**$971**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	**NJ SMART START INCENTIVE**
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
P-1	10	$3,590	$100	$3,490	$49	71.6
P-2	10	$3,590	$100	$3,490	$49	71.6
P-3	30	$7,074	$150	$6,924	$377	18.4
P-4	30	$7,074	$150	$6,924	$377	18.4
P-5	25	$5,930	$130	$5,800	$121	48.1
TOTAL	**Totals:**	**$27,258**	**$630**	**$26,628**	**$971**	**27.4**

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$27,258
NJ Smart Start Equipment Incentive ($):	$630
Net Installation Cost ($):	$26,628
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$971
Total Yearly Savings ($/Yr):	$971
Estimated ECM Lifetime (Yr):	15
Simple Payback	27.4
Simple Lifetime ROI	-45.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$14,565
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	($15,036.27)

ECM #4: Condensing Boiler Installation

Description:

There are two existing Kewanee fire tube boilers, located in the main building mechanical room. These boilers are used as the primary source of heat for majority of the high school. These boilers operate as primary and standby, meaning only one boiler operates at a time. There is an additional separate boiler plant that serves the latest addition to the school, which was completed in 2006. This boiler plant consists of two (2) Aerco KC series boilers. These boilers serve the hot water loop throughout the newest section of the building.

The Kewanee boilers are approximately seventeen (17) years old and are still within their expected useful service life. However, these boilers are fairly inefficient when compared to newer, condensing boilers, which makes replacement of these boilers an option that will provide substantial energy savings. The Aerco boilers are only 3 to 4 years old and are still well within their useful service life. In addition, these boilers are very efficient and replacing these boilers would not provide much energy savings.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 92%. The existing boiler's efficiency is approximately 65%, which makes the condensing boilers an 27% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of two (2) condensing gas fired boilers to replace one (1) of the existing Kewanee fire tube boilers. The basis for this ECM is Aerco condensing boiler; model number BMK-3.0. The boiler installation is based on a one for one replacement based on capacity of the existing boiler. The other Kewanee boiler will remain and only serve as a backup to the new boilers.

Energy Savings Calculations:

Currently, the only gas consuming equipment connected to the building gas meter is a Trane gas fired makeup air unit that serves the kitchen, the other boiler plant and (4) gas fired domestic hot water heaters. Therefore, annual energy consumption of the boilers has to be estimated. In this calculation, it is assumed that the energy consumption of the boilers will be in proportion with the ratio of the total heating capacity of each piece of equipment.

Below calculation is performed to estimate annual gas usage of the cast iron boilers:

Total facility heating capacity (Heating equipment output capacity):
(1) Kewanee fire tube boilers = 3,923 MBH
(2) Aerco KC Boilers = 1,800 MBH

(4) Domestic Hot Water Heaters	= 659 MBH
Total Output Capacity	**= 6,382 MMBH**

Total facility gas heating capacity:	6,382 MBH
Total Capacity – Kewanee Boiler only:	3,923 MBH
Percent usage by boilers:	61.5% of Total
Estimated natural gas usage	61.5% of 50,344 Therms
Estimated natural gas usage	30,946 Therms

$$\text{Bldg Heat Required} = \text{Heating Nat. Gas (Therm)} \times \text{Heating Eff (\%)} \times \text{Fuel Heat Value } (\frac{\text{BTU}}{\text{Therm}})$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg. Heat Required (BTU)}}{\text{New Heating Eff (\%)} \times \text{Fuel Heat Value } (\frac{\text{BTU}}{\text{Therm}})}$$

$$\text{Energy Cost} = \text{Heating Gas Usage (Therms)} \times \text{Ave Fuel Cost } (\frac{\$}{\text{Therm}})$$

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Existing Nat Gas (Therms)	36,026	0	
Boiler Efficiency (%)	75%	92%	17%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	2,702	2,702	
Gas Cost ($/Therm)	0.85	0.85	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	36,026	29,369	6,657
Energy Cost ($)	$30,622	$24,964	$5,658
COMMENTS:			

Note: Concord Engineering is utilizing a seasonal average efficiency of 92% to account for efficiencies based on an outside air reset schedule.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: $1.00 per MBH, or $6,000.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$218,888
NJ Smart Start Equipment Incentive ($):	$6,000
Net Installation Cost ($):	$212,888
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$5,658
Total Yearly Savings ($/Yr):	$5,658
Estimated ECM Lifetime (Yr):	25
Simple Payback	37.6
Simple Lifetime ROI	-33.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$141,450
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($114,364.14)

ECM #5: High Efficiency Gas Hot Water Heater

Description:

The original section of the Middle School is served by two (2) gas fired hot water heaters. Both of these water heaters are State model storage tank type water heaters with standard efficiency, rated for 275 MBH input and having 100 gallons of storage. There is an additional water heater located in the 700 section mechanical room. This water heater is an A.O. Smith, standard efficiency gas fired hot water heater rated for 154 MBH input. The water heaters in the original building mechanical room are still within their useful service life; however, energy savings could be realized by replacing these units with high efficiency condensing style hot water heaters. The water heater in the 700 wing has surpassed its useful service life and should be replaced.

This ECM will replace the two (2) State water heaters with two (2) A.O. Smith Cyclone water heaters, model BTH-199. The A.O. Smith water heater located in the 700 section will be replaced with an A.O. Smith Cyclone, model BTH-150. These water heaters have operating efficiencies of 95%.

Energy Savings Calculations:

DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Gas Hot Water Heater	High Efficiency Heater	
Building Type	Education		
Building Square-foot	179,922	179,922	
Domestic Water Usage, kBtu	935,594.40	935,594.40	
DHW Heating Fuel Type	Gas	Gas	
Heating Efficiency	80%	95%	15%
Total Usage (kBTU)	1,169,493	984,836	184,657
Nat Gas Cost ($/Therm)	$ 0.850	$ 0.850	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	11,695	9,848	1,847
Energy Cost ($)	$9,941	$8,371	$1,570
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Energy Density for "Education" type building = 5.2 kBtu / SF / year

$$DHW\ \ Heat\ Usage = Energy\ Density\left(\frac{kBtu\ yr}{SF}\right)\times Building\ Square\ Footage\ (SF)$$

$$DHW\ Total\ Usage = \frac{Dom\ HW\ \ Heat\ Cons.(Btu)}{Heating\ \ Eff.(\%)\times Fuel\ \ Heat\ Value\left(\frac{BTU}{Fuel\ Unit}\right)}$$

$$Energy\ Cost = Heating\ \ Fuel\ Usage(Fuel\ Units)\times Ave\ Fuel\ Cost\left(\frac{\$}{Fuel\ Unit}\right)$$

From the **NJ Smart Start Appendix**, the installation of new condensing hot water heaters warrants the following incentive: $2.00 per MBH, or $1,096.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$32,793
NJ Smart Start Equipment Incentive ($):	$1,096
Net Installation Cost ($):	$31,697
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,570
Total Yearly Savings ($/Yr):	$1,570
Estimated ECM Lifetime (Yr):	25
Simple Payback	20.2
Simple Lifetime ROI	23.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$39,250
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($4,358.36)

ECM #6: Install VFD on Chilled Water Pumps

Description:

The chilled water system at the Linwood Middle School utilizes three (3) constant speed pumps to circulate hot water from the boiler plant throughout the building. Based on the survey of the existing equipment it appears that the hot water air handlers have 2-way control valves for flow control. 2-way control valves provide flow through the heat exchanger equipment only when there is a call for cooling, and allow the system to reduce flow when it is not needed.

This ECM includes the installation of Variable Frequency Drives on the two (2) 30 horsepower existing chilled water pumps. The VFD control is based on a differential pressure sensor in the water loop to measure demand for water. This ECM should be implemented with ECM#3 to maximize savings potential. For the purpose of this ECM, the NEMA Premium motor efficiency was used to calculate savings.

Energy Savings Calculations:

$$\text{Pump Power HP} = \frac{\text{Flow}_{\text{GPM}} \times \text{Head}_{\text{ft-hd.}}}{3650 \times \eta_{\text{Pump}} \times \eta_{\text{motor}}}$$

$$\text{Energy Consumption (kWh)} = \text{Motor HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Hours of operation (Hr)} \times \frac{1}{\eta_{\text{motor}}}$$

$$\text{Total Energy Consumption (kWh)} = \sum \text{Energy Consumption of Each Motor}$$

$$\text{Energy Cost (\$)} = \text{Total Comsumption(kWh)} \times \text{Average Cost of Electric} \left(\frac{\$}{\text{kWh}}\right)$$

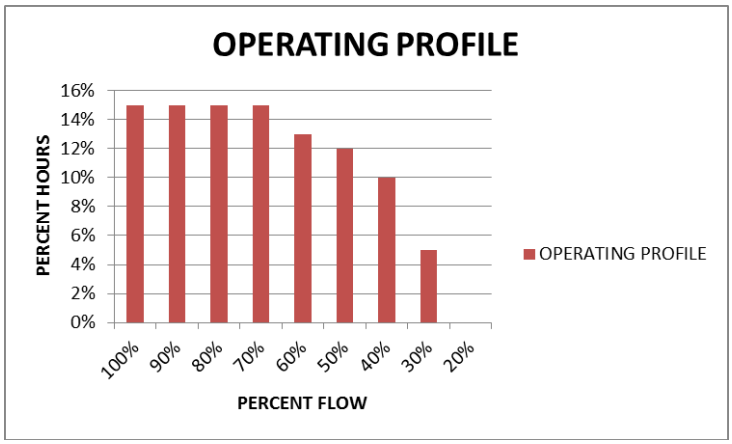
Affinity Laws are used in order to calculate energy savings by calculating the reduced power consumption requirement based a reduction in flow. Affinity laws, are as following:

Q = Flow, n = RPM, p = total pressure

$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

CHILLED WATER PUMP SET VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	Throttle	VFD	-
Motor Nameplate HP	30.0	30.0	
Flow* (GPM)	500	500	-
Head* (Ft)	190	190	-
Pump Efficiency (%)	75.0%	75.0%	-
Motor Efficiency (%)	94.1%	94.1%	0.0%
Operating Hrs	2745	2745	-
Estimated Power (HP)	34.0	34.0	0.00
Elec Cost ($/kWh)	0.145	0.145	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	73,972	28,623	45,349
Electric Energy Cost ($)	$10,726	$4,150	$6,576
COMMENTS:			

Estimated Operating Profile with VFD



Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$78,600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$78,600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,576
Total Yearly Savings ($/Yr):	$6,576
Estimated ECM Lifetime (Yr):	25
Simple Payback	12.0
Simple Lifetime ROI	109.2%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$164,400
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$35,908.86

ECM #7: Install VFD on Hot Water Pumps

Description:

The hot water system at the Linwood Middle School utilizes two constant speed pumps to circulate hot water from the boiler plant throughout the building. Based on the survey of the existing equipment it appears that the hot water air handlers have 2-way control valves for flow control. 2-way control valves provide flow through the heat exchanger equipment only when there is a call for cooling, and allow the system to reduce flow when it is not needed.

This ECM includes the installation of Variable Frequency Drives on the two (2) 10 horsepower existing hot water pumps. The VFD control is based on a differential pressure sensor in the water loop to measure demand for water. This ECM should be implemented with ECM#3 to maximize savings potential. For the purpose of this ECM, the NEMA Premium motor efficiency was used to calculate savings. In addition, ECM #5 would have to be implemented, as the existing boilers cannot operate under variable flow conditions.

Energy Savings Calculations:

$$\text{Pump Power HP} = \frac{\text{Flow}_{\text{GPM}} \times \text{Head}_{\text{ft-hd.}}}{3650 \times \eta_{\text{Pump}} \times \eta_{\text{motor}}}$$

$$\text{Energy Consumption (kWh)} = \text{Motor HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Hours of operation (Hr)} \times \frac{1}{\eta_{\text{motor}}}$$

$$\text{Total Energy Consumption (kWh)} = \sum \text{Energy Consumption of Each Motor}$$

$$\text{Energy Cost (\$)} = \text{Total Comsumption(kWh)} \times \text{Average Cost of Electric} \left(\frac{\$}{\text{kWh}}\right)$$

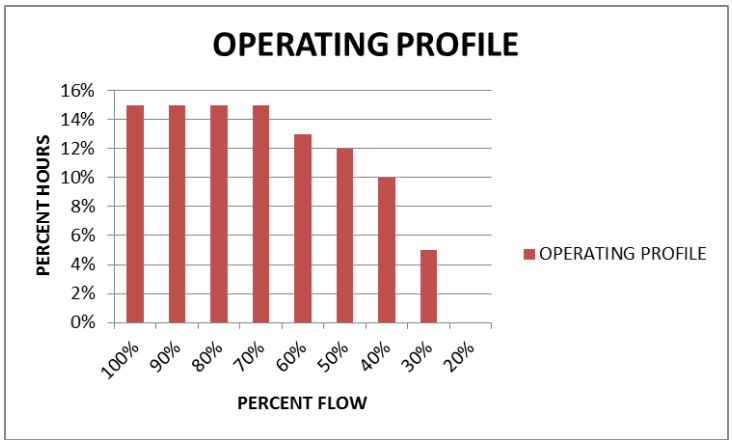
Affinity Laws are used in order to calculate energy savings by calculating the reduced power consumption requirement based a reduction in flow. Affinity laws, are as following:

Q = Flow, n = RPM, p = total pressure

$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

HOT WATER PUMP SET VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	Throttle	VFD	-
Motor Nameplate HP	10.0	10.0	
Flow* (GPM)	457	457	-
Head* (Ft)	110	110	-
Pump Efficiency (%)	75.0%	75.0%	-
Motor Efficiency (%)	91.7%	91.7%	0.0%
Operating Hrs	2745	2745	-
Estimated Power (HP)	18.5	18.5	0.00
Elec Cost ($/kWh)	0.145	0.145	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	41,219	9,791	31,428
Electric Energy Cost ($)	$5,977	$1,420	$4,557
COMMENTS:			

Estimated Operating Profile with VFD



Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$71,400
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$71,400
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,557
Total Yearly Savings ($/Yr):	$4,557
Estimated ECM Lifetime (Yr):	20
Simple Payback	15.7
Simple Lifetime ROI	27.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$91,140
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($3,603.35)

ECM #8: Install Domestic Water Booster Skid w/VFD

Description:

Domestic Water is supplied to Linwood Middle School building via a set of two (2) domestic water booster pumps. The pump skid is fairly old and the pump motors are standard efficiency motors. The pump set operates 24/7. Modern domestic water booster pump systems utilize variable frequency drives and advanced controls in order to vary flow based on the facility water demand.

This ECM replaces the existing domestic cold water booster pump set with a new variable flow domestic booster pump set. The new pump set includes new pumps, premium efficiency motors, variable frequency drives and controls. The basis for this ECM is Delta Pak ES System variable flow domestic booster pump control system.

Energy Savings Calculations:

$$\text{Pump Power HP} = \frac{\text{Flow}_{\text{GPM}} \times \text{Head}_{\text{ft-hd.}}}{3650 \times \eta_{\text{Pump}} \times \eta_{\text{motor}}}$$

$$\text{Energy Consumption (kWh)} = \text{Motor HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Hours of operation (Hr)} \times \frac{1}{\eta_{\text{motor}}}$$

$$\text{Total Energy Consumption (kWh)} = \sum \text{Energy Consumption of Each Motor}$$

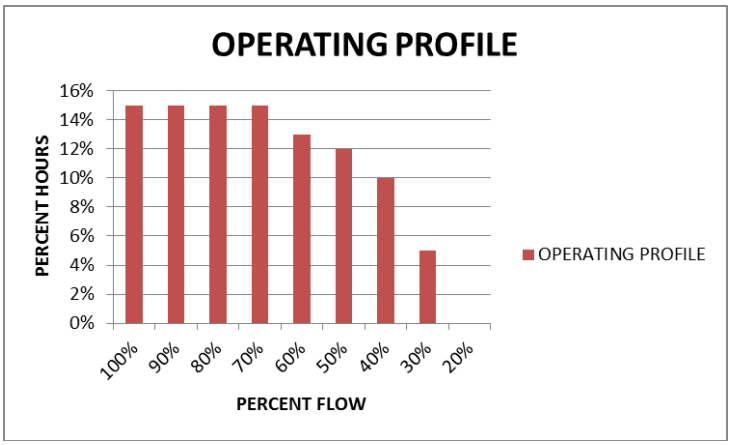
$$\text{Energy Cost (\$)} = \text{Total Comsumption(kWh)} \times \text{Average Cost of Electric} \left(\frac{\$}{\text{kWh}}\right)$$

Affinity Laws are used in order to calculate energy savings by calculating the reduced power consumption requirement based a reduction in flow. Affinity laws, are as following:

Q = Flow, n = RPM, p = total pressure

$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

Estimated Operating Profile with VFD



Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$22,310
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$22,310
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,235
Total Yearly Savings ($/Yr):	$1,235
Estimated ECM Lifetime (Yr):	15
Simple Payback	18.1
Simple Lifetime ROI	-17.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$18,525
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	($7,566.65)

ECM #9: Vending Miser Controls

Description:

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

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

Energy Savings Calculations:

See **Vending Miser Appendix** for calculation methods and analysis.

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$537
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$537
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$869
Total Yearly Savings ($/Yr):	$869
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.6
Simple Lifetime ROI	2327.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$13,035
Internal Rate of Return (IRR)	162%
Net Present Value (NPV)	$9,837.07

ECM #10: Set Computers to Automatic Stand-by or Hibernate Modes

Description:

During the survey, it was noticed that the majority of the computers were left at ON position with the monitors at Screen Saver or OFF positions.

Many personal computers (PC) came equipped with automatic Sleep Mode or Hibernate (power down) mode features. Normally computers boot up from Sleep Mode or Hibernate mode much faster than powering up from Shut Down position.

Based on an independent study by the U.S. Department of Energy, Energy star® rated computers use approximately 70% less power during Sleep Mode. It is recommended to set up the PCs at this facility to switch into Sleep Mode after a short period of inactivity and Hibernate mode after a long period of inactivity.

This ECM includes configuring the computers in the classrooms and the offices such that they automatically switch into:

- Sleep Mode after 15 minutes of inactivity
- Hibernate after 60 minutes of inactivity

The inactivity times above can be adjusted based on experience or preference. Even though this ECM can be implemented easily in house, the calculations assume an independent computer technician performing the task at a typical market rate.

Energy Savings Calculations:

No. of Computers:	378
Operating Weeks per Yr:	42
Estimated percentage of computers left ON over night:	50%

$$\text{Electric Usage} = \frac{\#\text{of Computers} \times \text{Computer Power (W)} \times \text{Operation (Hrs)}}{1000\left(\frac{\text{W}}{\text{KW}}\right)}$$

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

The cost of configuring the computers to automatically sleep or hibernate is based on 5 minutes per computer per technician at an hourly rate indicated below.

Implementation Costs: = # Computers X Configuration Time X Cost per Hour
= 378 Computers X 5 Minutes/Computer X $100 per Hour

= $3,150

AUTOMATIC SLEEP OR HIBERNATE MODES FOR COMPUTERS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Manual Operation	Auto Power Save	-
# of Computers	378	378	-
% Computers left ON	50%	50%	-
Power when left ON (Watt)	50	50	-
Power at Stand-by (Watt)	5	5	-
Power at Hibernate (Watt)	4	4	-
Power when OFF (Watt)	0	0	-
Operating Weeks per Yr	42	42	-
Operating Hours per Week	168	168	-
Hours/Wk Computers ON	120	20	-
Hours/Wk at Sleep Mode	0	20	-
Hours/Wk at Hibernate Mode	0	80	-
Hours/Wk at Power Down	48	48	-
Elec Cost ($/kWh)	0.145	0.145	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Usage (kWh)	47,628	8,732	38,896
Energy Cost ($)	$6,906	$1,266	$5,640
COMMENTS:	Calculation assumes computers currently run throughout school week and get shut down over the weekend.		

Energy Savings Summary:

ECM #10 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,150
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$3,150
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$5,640
Total Yearly Savings ($/Yr):	$5,640
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.6
Simple Lifetime ROI	2585.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$84,600
Internal Rate of Return (IRR)	179%
Net Present Value (NPV)	$64,179.95

ECM #11: Install VFD on Cooling Tower Fan

Description:

The Cooling Towers for the chillers are approximately fifteen year old EVAPCO Towers. The primary tower has low and high speed motors for the fans. The two motor set up allows the tower to move to a reduced horsepower motor during a part loading scenario. The installation of a VFD will allow the tower fan to modulate at multiple loads based on the required amount airflow needed to maintain the necessary condenser water temperature for the loop.

This ECM includes the installation of a variable frequency drive and inverter duty premium efficiency motor on the 20 horsepower tower fan along with the required tower controls to modulate the fan speed.

Energy Savings Calculations:

Load Factor = 75% (without VFD)

$$\text{Energy Consumption (kWh)} = \text{Motor HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Hours of operation (Hr)} \times \frac{1}{\eta_{\text{motor}}}$$

$$\text{Total Energy Consumption (kWh)} = \sum \text{Energy Consumption of Each Motor}$$

$$\text{Energy Cost (\$)} = \text{Total Comsumption(kWh)} \times \text{Average Cost of Electric} \left(\frac{\$}{\text{kWh}}\right)$$

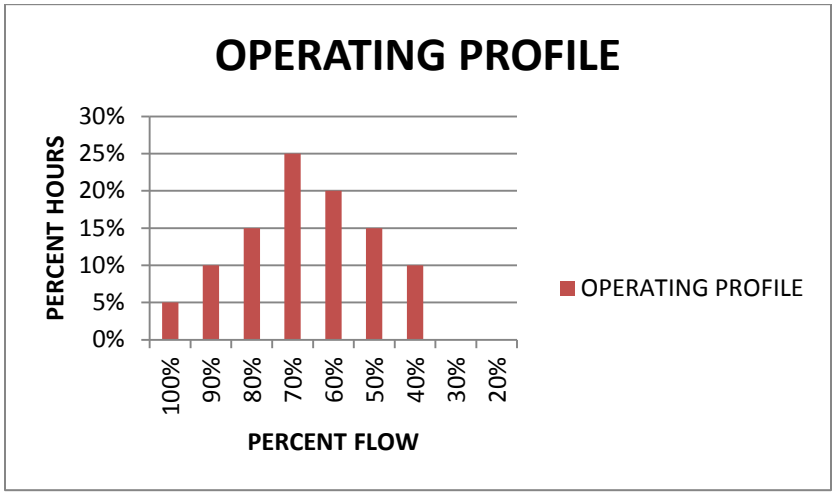
Affinity Laws are used in order to calculate energy savings by calculating the reduced power consumption requirement based a reduction in flow. Affinity laws, are as following:

Q = Flow, n = RPM, p = total pressure

$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

COOLING TOWER FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	2-Speed	VFD Fan	
Control	On/Off	VFD	-
Quantiy of Fans	1	1	
Motor HP (Full Load)	20.0	20.0	
Motor Efficiency (%)	93.0%	93.0%	
Motor HP (Part Load)	5.0		
Motor Efficiency (%)	89.5%		
Operating Hrs	3000	3000	-
Full Load Hours	1100		
Part Load Hours	1900		
Load Factor	75.0%	75.0%	
Elec Cost ($/kWh)	0.145	0.145	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	25,566	17,028	8,538
Electric Energy Cost ($)	$3,707	$2,469	$1,238
COMMENTS:			

Estimated Operating Profile with VFD



Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	**NJ SMART START INCENTIVE**
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150

Energy Savings Summary:

ECM #11 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$15,600
NJ Smart Start Equipment Incentive ($):	$125
Net Installation Cost ($):	$15,475
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,238
Total Yearly Savings ($/Yr):	$1,238
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.5
Simple Lifetime ROI	20.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$18,570
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($695.84)

REM #1: 380.23 kW Solar System

Description:

Linwood Middle School has available roof and parking lot space that could accommodate a significant amount of solar generation. Based on the available areas a 380.23 KW DC solar array could be installed, assuming the existing roof structure is capable of supporting an array. The array will produce approximately 446,589 kilowatt-hours annually that will reduce the overall electric usage of the facility by 27.5%.

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 ($):	$2,380,113
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$2,380,113
Maintenance Savings ($/Yr):	$85,336
Energy Savings ($/Yr):	$64,755
Total Yearly Savings ($/Yr):	$150,091
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.9
Simple Lifetime ROI	-5.4%
Simple Lifetime Maintenance Savings	$1,280,040
Simple Lifetime Savings	$2,251,365
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	($588,336.38)

V. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy 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. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

North Brusnwick Township BOE - Linwood Middle School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade - Gymnasium, Caferia & Exterior	$24,355	$14,440	$0	$38,795	$6,336	$0	$6,336	15	$95,040	$0	145.0%	6.1	14.06%	$36,843.76
ECM #2	Lighting Controls	$35,850	$7,050	$3,650	$39,250	$10,491	$0	$10,491	15	$157,365	$0	300.9%	3.7	25.88%	$85,990.88
ECM #3	NEMA Premium Pump Motors	$15,288	$11,970	$630	$26,628	$971	$0	$971	15	$14,565	$0	-45.3%	27.4	-6.74%	($15,036.27)
ECM #4	Boiler Replacement	$108,860	$110,028	$6,000	$212,888	$5,658	$0	$5,658	25	$141,450	$0	-33.6%	37.6	-2.93%	($114,364.14)
ECM #5	Domestic Hot Water Heater Replacement	$18,289	$14,505	$1,096	$31,697	$1,570	$0	$1,570	25	$39,250	$0	23.8%	20.2	1.72%	($4,358.36)
ECM #6	VFD on CHW Pumps	$45,200	$33,400	$0	$78,600	$6,576	$0	$6,576	25	$164,400	$0	109.2%	12.0	6.72%	$35,908.86
ECM #7	VFD on HW Pumps	$40,800	$30,600	$0	$71,400	$4,557	$0	$4,557	20	$91,140	$0	27.6%	15.7	2.45%	($3,603.35)
ECM #8	Domestic Water VFD Booster Skid	$13,685	$8,625	$0	$22,310	$1,235	$0	$1,235	15	$18,525	$0	-17.0%	18.1	-2.24%	($7,566.65)
ECM #9	Vending Machine Controls	$537	$0	$0	$537	$869	$0	$869	15	$13,035	$0	2327.4%	0.6	161.82%	$9,837.07
ECM #10	Set Computers to Automatic Stand-by or Hibernate Modes	$0	$3,150	$0	$3,150	$5,640	$0	$5,640	15	$84,600	$0	2585.7%	0.6	0.00%	$0.00
ECM #11	Install VFD on Cooling Tower Fan	$9,840	$5,760	$125	$15,475	$1,238	$0	$1,238	15	$18,570	$0	20.0%	12.5	0.00%	$0.00
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	380.23 KW Solar Array	$2,380,113	$0	$0	$2,380,113	$64,755	$85,336	$150,091	15	$2,251,365	$1,280,040	-5.4%	15.9	-0.69%	($588,336.38)

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

APPENDIX B

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February 15, 2011:

Electric Chillers

Water-Cooled Chillers	$12 - $170 per ton
Air-Cooled Chillers	$8 - $52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $92 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per VFD rated hp
Compressors	$5,250 to $12,500 per drive
Cooling Towers ≥ 10 hp	$60 per VFD rated hp

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$25 per fixture (1-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start Including Parking Lot	$25 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $200 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture

Prescriptive Lighting - LED

LED New Exit Sign Fixture Existing Facility < 75 kw Existing Facility > 75 kw	 $20 per fixture $10 per fixture
LED Display Case Lighting	$30 per display case
LED Shelf-Mtd. Display & Task Lights	$15 per linear foot
LED Portable Desk Lamp	$20 per fixture
LED Wall-wash Lights	$30 per fixture
LED Recessed Down Lights	$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	$100 per fixture
LED Parking Garage Luminaries	$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	$150 per fixture
LED High-Bay-Aisle Lighting	$150 per fixture
LED Bollard Fixtures	$50 per fixture
LED Linear Panels (2x2 Troffers only)	$100 per fixture
LED Fuel Pump Canopy	$100 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled
Daylight Dimming - office	$50 per fixture controlled

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

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 a IRR of at least 10%.
Multi Measures Bonus	15%

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
North Brunswick BOE - Linwood Middle School

Building ID: 3315970
For 12-month Period Ending: July 31, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 07, 2012

Facility
North Brunswick BOE - Linwood Middle School
25 Linwood Place
North Brunswick, NJ 08902

Facility Owner
North Brunswick Township Board of Education
300 Old Georges Road
North Brunswick, NJ 08902

Primary Contact for this Facility
Susan Irons
300 Old Georges Road
North Brunswick, NJ 08902

Year Built: 1996
Gross Floor Area (ft²): 204,557

Energy Performance Rating[2] (1-100) 54

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	5,537,871
Natural Gas (kBtu)[4]	5,206,268
Total Energy (kBtu)	10,744,139

Energy Intensity[4]

Site (kBtu/ft²/yr)	53
Source (kBtu/ft²/yr)	117

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,061

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	55
National Median Source EUI	122
% Difference from National Median Source EUI	-4%
Building Type	K-12 School

Stamp of Certifying Professional

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

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	North Brunswick BOE - Linwood Middle School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	25 Linwood Place, North Brunswick, NJ 08902	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Linwood Middle School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	204,557 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	247	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
06/23/2012	07/22/2012	134,913.00
05/23/2012	06/22/2012	149,412.00
04/23/2012	05/22/2012	153,999.00
03/23/2012	04/22/2012	122,031.00
02/23/2012	03/22/2012	131,824.00
01/23/2012	02/22/2012	127,123.00
12/23/2011	01/22/2012	122,669.00
11/23/2011	12/22/2011	128,761.00
10/23/2011	11/22/2011	126,732.00
09/23/2011	10/22/2011	142,861.00
08/23/2011	09/22/2011	150,812.00
electric Consumption (kWh (thousand Watt-hours))		**1,491,137.00**
electric Consumption (kBtu (thousand Btu))		**5,087,759.44**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**5,087,759.44**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
06/23/2012	07/22/2012	2,217.00
05/23/2012	06/22/2012	390.00
04/23/2012	05/22/2012	3,005.00
03/23/2012	04/22/2012	4,713.00
02/23/2012	03/22/2012	6,713.00
01/23/2012	02/22/2012	8,591.00
12/23/2011	01/22/2012	9,998.00
11/23/2011	12/22/2011	7,434.00
10/23/2011	11/22/2011	5,096.00
09/23/2011	10/22/2011	252.00
08/23/2011	09/22/2011	136.00

gas Consumption (therms)	**48,545.00**
gas Consumption (kBtu (thousand Btu))	**4,854,500.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**4,854,500.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
North Brunswick BOE - Linwood Middle School
25 Linwood Place
North Brunswick, NJ 08902

Facility Owner
North Brunswick Township Board of Education
300 Old Georges Road
North Brunswick, NJ 08902

Primary Contact for this Facility
Susan Irons
300 Old Georges Road
North Brunswick, NJ 08902

General Information

North Brunswick BOE - Linwood Middle School	
Gross Floor Area Excluding Parking: (ft^2)	204,557
Year Built	1996
For 12-month Evaluation Period Ending Date:	July 31, 2012

Facility Space Use Summary

Linwood Middle School	
Space Type	K-12 School
Gross Floor Area (ft^2)	204,557
Open Weekends?	No
Number of PCs	247
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	100
Months °	10
High School?	No
School District °	north brunswick twp

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2012)	**Baseline** (Ending Date 07/31/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	54	54	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	53	53	43	N/A	55
Source ($kBtu/ft^2$)	117	117	95	N/A	122
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,061	1,061	863	N/A	1,104
$kgCO_2e/ft^2$/year	5	5	4	N/A	5

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

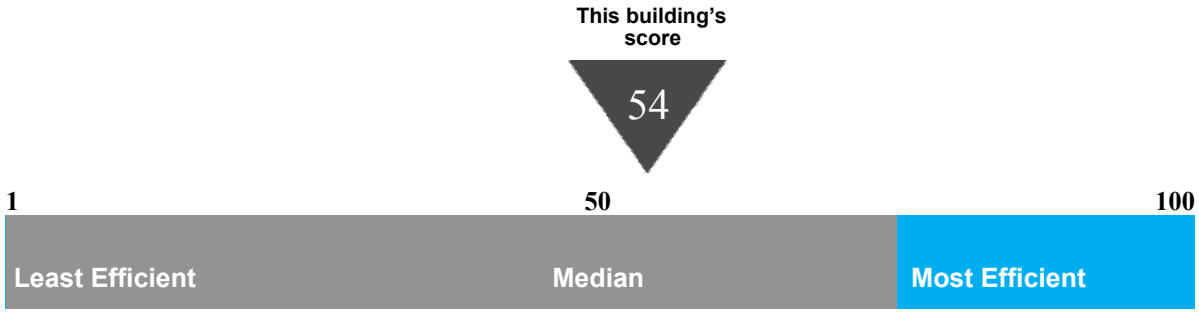
Statement of Energy Performance

2012

North Brunswick BOE - Linwood Middle School
25 Linwood Place
North Brunswick, NJ 08902

Portfolio Manager Building ID: 3315970

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 117 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending July 2012

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

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

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 11/07/2012

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Linwood Middle School

AC Units

Tag	RTU-201-LIN	RTU-101-LIN	
Unit Type	Packaged Rooftop Unit	Packaged Rooftop Unit	Split System Condenser
Qty	1	1	2
Location	Roof	Roof	Roof
Area Served	Science Wing	Science Wing	Library Computer Closet
Manufacturer	Trane	Trane	EMI
Model #	SLHFF404DA45	SLHFF504DA56	S1CA2000D00
Serial #	C07K10719	C07K10718	1-07-M-2253-52
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	40 Tons	50 Tons	1 Ton
Cooling Efficiency (SEER/EER)	9.5 EER	9.5 EER	14 SEER / 12.9 EER
Heating Type	Hot Water	Hot Water	N/A
Heating Input (MBH)	See Boiler Plant	See Boiler Plant	N/A
Efficiency	See Boiler Plant	See Boiler Plant	N/A
Fuel	Hot Water	Hot Water	N/A
Approx Age	5	5	5
ASHRAE Service Life	15	15	15
Remaining Life	10	10	10
Comments	Loren-Cook Centrifugal Vent Set Blower with backward inclined wheel.		

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

AC Units

Tag			
Unit Type	Split System Condenser	Gas Fired Outdoor Unit Heater	Split System Condenser
Qty	1	1	3
Location	Roof	Roof	Low Roof
Area Served	Teacher Lounge		-
Manufacturer	Sanyo	Trane	Arcoaire
Model #	C1822 / KS1822	GRCA40GFHB0N2CP 2V2A0	Could Not Access Roof
Serial #	0083083	A96B32783	
Cooling Type	DX, R-22	N/A	DX, R-22
Cooling Capacity (Tons)	1.5 Tons	N/A	Could Not Access Roof
Cooling Efficiency (SEER/EER)	10.4 SEER	N/A	
Heating Type	N/A	Gas Fired HX	N/A
Heating Input (MBH)	N/A	400 MBH	N/A
Efficiency	N/A	79%	N/A
Fuel	N/A	Natural Gas	N/A
Approx Age	4	16	5
ASHRAE Service Life	15	15	15
Remaining Life	11	(1)	10
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Linwood Middle School

Boilers

Tag	B-1,2		
Unit Type	Gas Fired Hot Water Boiler	Firetube Boiler	
Qty	2	2	
Location	New Mechanical Room	Old Mechanical Room	
Area Served	New Wing	Hot Water Loop	
Manufacturer	Aerco	Kewanee	
Model #	KC Series	L3SW-125-G	
Serial #	G-07-1704	98819	
Input Capacity (Btu/Hr)	1,000 MBH	5,231 MBH	
Rated Output Capacity (Btu/Hr)	860-930 MBH	4,184 MBH	
Approx. Efficiency %	86-93%	75.0%	
Fuel	Natural Gas	Natural Gas	
Approx Age	5	16	
ASHRAE Service Life	35	35	
Remaining Life	30	19	
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Linwood Middle School

Domestic Water Heaters

Tag			
Unit Type	Domestic Hot Water Heater	Domestic Hot Water Heater	Domestic Hot Water Heater
Qty	1	2	1
Location	New Wing Mech Room	Old Mechanical Room	Mechanical Room
Area Served	New Wing Domestic Loop	Domestic Hot Water Loop	Restrooms
Manufacturer	A.O. Smith	State	A.O. Smith
Model #	BTH 120 100	SBD100275NEA	BTR 154 118
Serial #	L07M009260	A06M009854	F07M006741
Size (Gallons)	60 Gallons	100 Gallons	81 Gallons
Input Capacity (MBH/KW)	120 MBH	275 MBH	154 MBH
Recovery (Gal/Hr)	136.72 GPH	266.66 GPH	149.33 GPH
Efficiency %	95%	80%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Approx Age	5	6	14
ASHRAE Service Life	12	12	12
Remaining Life	7	6	(2)
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Linwood Middle School

Pumps

Tag	P-1,2		
Unit Type	Base Mounted End Suction	Domestic Water Booster Skid	Base Mounted End Suction
Qty	2	2	2
Location	New Mechanical Room	Old Mechanical Room	Old Mechanical Room
Area Served	New Wing Hot Water	Domestic Water Booster Skid	Hot Water Pump
Manufacturer	Bell & Gossett	SyncroFlo	Paco Pumps
Model #	1510 Series	60-5	11-30125-1A6201-1872
Serial #	C053105-02K70	960665-1	96R4025003-B
Horse Power	7.5 HP	5 HP	10 HP
Flow	180 GPM @ 80 FTHD	100 GPM	457 GPM @ 110 FtHD
Motor Info	WEG	Unimount 125	Marathon Electric
Electrical Power	208-230/460/3/60	208-230/460/3/60	230/460/3/60
RPM	1760 RPM	3495 RPM	1165 RPM
Motor Efficiency %	91.0%	85.5%	90.2%
Approx Age	4	16	16
ASHRAE Service Life	20	20	20
Remaining Life	16	4	4
Comments	Dunfoss VFD VLT 6000 HVAC	SyncroFlo	

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

Pumps

Tag			
Unit Type	Base Mounted End Suction	Base Mounted End Suction	
Qty	2	1	
Location	Old Mechanical Room	Old Mechanical Room	
Area Served	Chilled Water Pumps	Chilled Water Pumps	
Manufacturer	Paco Pumps	Paco Pumps	
Model #	-		
Serial #	-		
Horse Power	30 HP	25 HP	
Flow	-	-	
Motor Info	US Electric Motors	US Electric Motors	
Electrical Power	208-230/460/3/60	208-230/460/3/60	
RPM	1760 RPM	1765 RPM	
Motor Efficiency %	87.5%	88.5%	
Approx Age	16	16	
ASHRAE Service Life	20	20	20
Remaining Life	4	4	20
Comments			

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

APPENDIX E

CEG Project #: 9C12053
Facility Name: Linwood Middle School
Address: 25 Linwood Place
City, State, Zip North Brunswick, NJ 08902

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 603	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Media Center	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	72	7.70	20,030	Existing to Remain	0	4	107	0	7.70	20,030	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	4,006	$581
563	Media Center	2600	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	4	0.21	541	Existing to Remain	0	2	52	0	0.21	541	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Media Center Work Room	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
232.22	Media Center Tech	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	268	$39
232.22	Periodicals 601	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	3	0.26	671	Existing to Remain	0	3	86	0	0.26	671	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	134	$19
242.21	Classroom 609	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 611	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 612	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 610	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 608	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 606	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 604	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
232.22	Blue House Center 630	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	3	0.26	671	Existing to Remain	0	3	86	0	0.26	671	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	134	$19
563	Blue House Center 603	2600	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	6	0.31	811	Existing to Remain	0	2	52	0	0.31	811	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	162	$24
232.22	Blue House Side Offices (3)	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	3	20.0%	268	$39
242.21	Kitchenette	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Conference Room	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
242.21	Work Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
563	Work Room	2600	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	2	0.10	270	Existing to Remain	0	2	52	0	0.10	270	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Work Room Restrooms	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	149	Existing to Remain	0	2	62	0	0.12	149	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
121.14	Elevator	8760	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	2	78	1	0.08	683	Reballast & Relamp	Sylvania Lamp FO28/841/SS/ECO	2	50	1	0.05	438	0.03	245	$36	$25.00	$50.00	$75.00	$0.00	2.11	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 646	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 648	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 650	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 652	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 653	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
221.34	Classroom 651	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing to Remain	0	2	62	0	0.37	967	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	193	$28
242.21	Classroom 649	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 647	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
221.21	Boy's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing to Remain	0	2	62	0	0.37	967	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Girl's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing to Remain	0	2	62	0	0.37	967	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 667	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Resource Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 662	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 664	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 669	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
222.21	Custodial Closet 504	2000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	248	Existing to Remain	0	2	62	0	0.12	248	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
222.21	Girl's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	5	0.31	806	Existing to Remain	0	2	62	0	0.31	806	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
211.22	Staff Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	1	28	2	0.06	67	Existing to Remain	0	1	28	0	0.06	67	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
222.21	Boy's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	5	0.31	806	Existing to Remain	0	2	62	0	0.31	806	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 511	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	10	0.86	2,236	Existing to Remain	0	3	86	0	0.86	2,236	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 512	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	18	1.55	4,025	Existing to Remain	0	3	86	0	1.55	4,025	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 516	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	18	1.55	4,025	Existing to Remain	0	3	86	0	1.55	4,025	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Prep	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 513	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	18	1.55	4,025	Existing to Remain	0	3	86	0	1.55	4,025	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 517	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	18	1.55	4,025	Existing to Remain	0	3	86	0	1.55	4,025	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Prep	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.21	Office 420	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	2	0.17	447	Existing to Remain	0	3	86	0	0.17	447	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 419	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	10	0.86	2,236	Existing to Remain	0	3	86	0	0.86	2,236	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 417	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0

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231.33	Classroom 418	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	13	1.12	2,907	Existing to Remain	0	3	86	0	1.12	2,907	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.21	418 Storage	1200	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	2	0.17	206	Existing to Remain	0	3	86	0	0.17	206	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
222.21	418 Office	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	161	Existing to Remain	0	2	62	0	0.06	161	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
211.22	418 Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	1	28	2	0.06	67	Existing to Remain	0	1	28	0	0.06	67	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 416	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 415	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 414	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Boy's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	5	0.31	806	Existing to Remain	0	2	62	0	0.31	806	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Girl's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	5	0.31	806	Existing to Remain	0	2	62	0	0.31	806	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
211.22	Staff Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	1	28	2	0.06	67	Existing to Remain	0	1	28	0	0.06	67	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.11	Custodial Closet 504	2000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	248	Existing to Remain	0	2	62	0	0.12	248	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
222.21	Custodial Office 404	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	484	Existing to Remain	0	2	62	0	0.19	484	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.33	Classroom 413	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	14	1.20	3,130	Existing to Remain	0	3	86	0	1.20	3,130	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
211.22	413 Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	1	28	2	0.06	67	Existing to Remain	0	1	28	0	0.06	67	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 803	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 806	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 804	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 802	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 801	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 815	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 816	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 817	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 818	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 819	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 820	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 821	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 822	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
221.34	Custodial Office 829	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing to Remain	0	2	62	0	0.37	967	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	193	$28
232.22	Classroom 838	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	268	$39
232.22	Guidance	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	1	0.09	224	Existing to Remain	0	3	86	0	0.09	224	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Guidance	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	322	Existing to Remain	0	2	62	0	0.12	322	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Guidance - Anderson	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	3	0.26	671	Existing to Remain	0	3	86	0	0.26	671	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	AP Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Work Room 830	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	2	0.17	447	Existing to Remain	0	3	86	0	0.17	447	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.31	Boiler Room 837	4000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	1,488	Existing to Remain	0	2	62	0	0.37	1,488	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Teacher Planning	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	11	1.18	3,060	Existing to Remain	0	4	107	0	1.18	3,060	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	612	$89
221.34	Gym Storage	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	4	0.25	298	Existing to Remain	0	2	62	0	0.25	298	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	PE Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
221.34	Aux Gym Storage	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	149	Existing to Remain	0	2	62	0	0.12	149	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Boy's Locker Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	23	1.43	3,708	Existing to Remain	0	2	62	0	1.43	3,708	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	742	$108
221.21	Team Room 105	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	14	0.87	2,257	Existing to Remain	0	2	62	0	0.87	2,257	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$65
221.21	Girl's Locker Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	22	1.36	3,546	Existing to Remain	0	2	62	0	1.36	3,546	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	709	$103
221.21	Girl's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	484	Existing to Remain	0	2	62	0	0.19	484	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Boy's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	484	Existing to Remain	0	2	62	0	0.19	484	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 114	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	25	2.68	6,955	Existing to Remain	0	4	107	0	2.68	6,955	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	1,391	$202
221.34	Instrument Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing to Remain	0	2	62	0	0.37	967	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	193	$28
242.21	Servery	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	8	0.86	2,226	Existing to Remain	0	4	107	0	0.86	2,226	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	445	$65
563	Servery	2600	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	3	0.16	406	Existing to Remain	0	2	52	0	0.16	406	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Kitchen	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	19	2.03	5,286	Existing to Remain	0	4	107	0	2.03	5,286	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Kitchen Office	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
242.21	Dishwashing	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
242.21	Kitchen Rec.	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
551	Cafeteria	2600	Down Light, 90w PAR38	1	90	48	4.32	11,232	Relamp	18w LED PAR38	1	18	48	0.86	2,246	3.46	8,986	$1,303	$1,920.00	$1,200.00	$3,120.00	$0.00	2.39	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	449	$65
221.34	Stage	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	27	1.67	4,352	Existing to Remain	0	2	62	0	1.67	4,352	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Faculty Dinning	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	8	0.86	2,226	Existing to Remain	0	4	107	0	0.86	2,226	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Faculty Kitchen	4000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	248	Existing to Remain	0	2	62	0	0.06	248	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	50	$7
221.21	Faculty Closet	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	149	Existing to Remain	0	2	62	0	0.12	149	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Faculty Restroom (2)	4000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	496	Existing to Remain	0	2	62	0	0.12	496	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	2	20.0%	99	$14
242.21	School Store	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	6	0.64	1,669	Existing to Remain	0	4	107	0	0.64	1,669	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	334	$48
221.34	Boiler Room 837	4000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	8	0.50	1,984	Existing to Remain	0	2	62	0	0.50	1,984	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.34	Dressing Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	484	Existing to Remain	0	2	62	0	0.19	484	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	97	$14
242.21	Classroom 128	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	16	1.71	4,451	Existing to Remain	0	4	107	0	1.71	4,451	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	890	$129
232.22	128 Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
221.34	128 Storage	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	149	Existing to Remain	0	2	62	0	0.12	149	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 130	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 131	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	11	1.18	3,060	Existing to Remain	0	4	107	0	1.18	3,060	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	612	$89
242.21	Classroom 133	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	11	1.18	3,060	Existing to Remain	0	4	107	0	1.18	3,060	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	612	$89
232.22	Classroom 132	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
232.22	Classroom 135	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 143	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
232.22	Classroom 137	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
242.21	Classroom 136	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Office 138	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
232.22	Classroom 139	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Classroom 141	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	12	1.03	2,683	Existing to Remain	0	3	86	0	1.03	2,683	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.34	Classroom 140A	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	31	1.92	4,997	Existing to Remain	0	2	62	0	1.92	4,997	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	999	$145
232.22	Prep	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	3	0.26	671	Existing to Remain	0	3	86	0	0.26	671	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	134	$19
242.21	Classroom 142	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 143	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	6	0.64	1,669	Existing to Remain	0	4	107	0	0.64	1,669	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	334	$48
242.21	Classroom 144	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 852	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 855	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 859	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Prep	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	6	0.64	1,669	Existing to Remain	0	4	107	0	0.64	1,669	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	334	$48
242.21	Classroom 748	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 746	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 742	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 743	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 744	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 745	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 741	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 740	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
221.21	Boy's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	7	0.43	1,128	Existing to Remain	0	2	62	0	0.43	1,128	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Girl's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	7	0.43	1,128	Existing to Remain	0	2	62	0	0.43	1,128	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.34	Custodial Closet 504	2000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	124	Existing to Remain	0	2	62	0	0.06	124	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.34	Electrical Closet	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	74	Existing to Remain	0	2	62	0	0.06	74	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	White House Center	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	3	0.26	671	Existing to Remain	0	3	86	0	0.26	671	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	134	$19
563	White House Center	2600	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	7	0.36	946	Existing to Remain	0	2	52	0	0.36	946	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	189	$27
242.21	Work Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	White House Side Offices (4)	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	8	0.69	1,789	Existing to Remain	0	3	86	0	0.69	1,789	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	4	20.0%	358	$52
242.21	White House Office	3000	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	13	1.39	4,173	Existing to Remain	0	4	107	0	1.39	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 712	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 714	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 716	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 718	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 720	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 721	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 719	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 717	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Classroom 715	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	10	1.07	2,782	Existing to Remain	0	4	107	0	1.07	2,782	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	556	$81
242.21	Nurse	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	5	0.54	1,391	Existing to Remain	0	4	107	0	0.54	1,391	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	278	$40
221.21	Cots	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	9	0.56	1,451	Existing to Remain	0	2	62	0	0.56	1,451	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	290	$42
242.21	Nurse's Office	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
242.21	Screening	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
242.21	Exam Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	2	0.21	556	Existing to Remain	0	4	107	0	0.21	556	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	111	$16
221.21	Nurse's Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	74	Existing to Remain	0	2	62	0	0.06	74	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	CST	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
232.22	CST Side Offices (4)	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	8	0.69	1,789	Existing to Remain	0	3	86	0	0.69	1,789	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	4	20.0%	358	$52
232.22	Conference Room	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	2	0.17	447	Existing to Remain	0	3	86	0	0.17	447	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	89	$13
563	Hall	3000	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	7	0.36	1,092	Existing to Remain	0	2	52	0	0.36	1,092	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
232.22	Work Room 701	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	2	0.17	447	Existing to Remain	0	3	86	0	0.17	447	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	89	$13
232.22	Principal's Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	2	0.17	447	Existing to Remain	0	3	86	0	0.17	447	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	89	$13
227.22	Principal's Office	2600	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	58	2	0.12	302	Existing to Remain	0	2	58	0	0.12	302	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	60	$9
232.22	Conference Room	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$26
232.22	Main Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	268	$39
242.21	Classroom 710	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	8	0.86	2,226	Existing to Remain	0	4	107	0	0.86	2,226	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	445	$65
242.21	Classroom 708	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 704	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Prep	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	4	0.43	1,113	Existing to Remain	0	4	107	0	0.43	1,113	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	223	$32
242.21	Classroom 702	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121

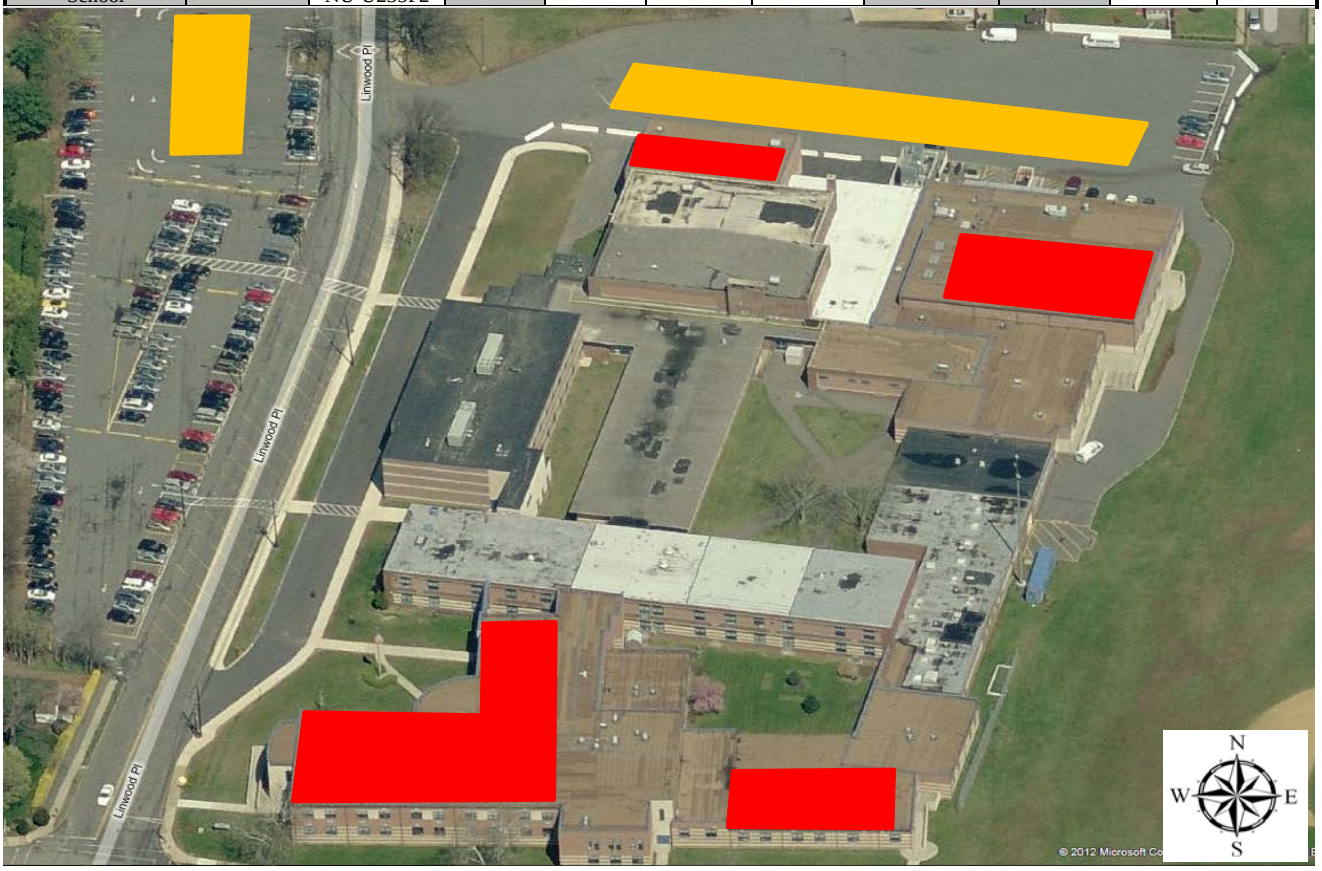
			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
242.21	Classroom 848	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 850	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	15	1.61	4,173	Existing to Remain	0	4	107	0	1.61	4,173	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	835	$121
242.21	Classroom 853	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	12	1.28	3,338	Existing to Remain	0	4	107	0	1.28	3,338	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	668	$97
242.21	Classroom 849	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
242.21	Classroom 847	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	9	0.96	2,504	Existing to Remain	0	4	107	0	0.96	2,504	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	501	$73
221.21	Men's Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	446	Existing to Remain	0	2	62	0	0.37	446	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	89	$13
221.21	Women's Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	446	Existing to Remain	0	2	62	0	0.37	446	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	89	$13
563	Lobby	3000	Recessed Down Light, (2)26w Quad CFL Lamp	2	52	3	0.16	468	Existing to Remain	0	2	52	0	0.16	468	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
221.21	Vestibule	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	322	Existing to Remain	0	2	62	0	0.12	322	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
	TOTAL					**1,695**	**160**	**414,912**					**49**	**156.20**	**405,681**	**3.48**	**9,231**	**$1,338**	**$1,945.00**	**$1,250.00**	**$3,195.00**	**$0.00**	**2.39**			**134**		**63,542**	**$9,214**

CEG Project #: 9C12053
Facility Name: Linwood Middle School
Address: 25 Linwood Place
City, State, Zip North Brunswick, NJ 08902

			Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
745	Main Gym 101	2600	400w MH, Prismatic Lens	1	495	30	14.85	38,610	Remove and Return	1x4, 6 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	354	30	10.62	27,612	4.23	10,998	$1,595	$6,000.00	$4,500.00	$10,500.00	$0.00	6.58	4	Dual Technology Occupancy Sensor - Remote Mnt.	3	20.0%	5,522	$801
745	Aux Gym	2600	400w MH, Prismatic Lens	1	495	15	7.43	19,305	Remove and Return	1x4, 6 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	354	15	5.31	13,806	2.12	5,499	$797	$3,000.00	$2,250.00	$5,250.00	$0.00	6.58	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	2,761	$400
738	Cafeteria	2600	175w MH Pendant Mount, Down Light	1	210	24	5.04	13,104	Relamp	Neu-Tech NT-4293-TR-HO, 42w LED Retrofit	1	42	24	1.01	2,621	4.03	10,483	$1,520	$10,800.00	$4,800.00	$15,600.00	$0.00	10.26	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	524	$76
738	Lobby	3000	175w MH Pendant Mount, Down Light	1	210	1	0.21	630	Relamp	Neu-Tech NT-4293-TR-HO, 42w LED Retrofit	1	42	1	0.04	126	0.17	504	$73	$450.00	$200.00	$650.00	$0.00	8.89	0	No New Controls	0	0.0%	0	$0
728	Exterior	4000	100w MH Wallpack	1	125	18	2.25	9,000	Remove and Return	28w LED Wallpack	1	28	18	0.50	2,016	1.75	6,984	$1,013	$2,160.00	$1,440.00	$3,600.00	$0.00	3.55	0	No New Controls	0	0.0%	0	$0
	TOTAL					**88**	**30**	**80,649**					**88**	**17**	**46,181**	**12**	**34,468**	$4,998	$22,410	$13,190	$35,600	**0**	7.12			**7**		**8,808**	$1,277

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
Linwood Middle School	34975	SHARP NU-U235F2	1618	17.5	28,381	380.23	446,589	308.0	67,794	13.40



.= Proposed PV Layout = Proposed Parking PV Layout

Notes:

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

Project Name: **LGEA Solar PV Project - Linwood Middle School**
Location: **North Brunswick, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$2,380,113
Annual kWh Production	446,589
Annual Energy Cost Reduction	$64,755
Average Annual SREC Revenue	$85,336

Simple Payback: **15.86** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.145**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	446,589	$64,755	$0	$111,647	$140,060	$100,956	($64,614)	($64,614)
2	$0	444,356	$66,698	$0	$111,089	$133,834	$107,183	($63,230)	($127,844)
3	$0	442,134	$68,699	$0	$110,534	$127,223	$113,794	($61,784)	($189,628)
4	$0	439,924	$70,760	$0	$109,981	$120,204	$120,813	($60,276)	($249,904)
5	$0	437,724	$72,883	$4,509	$109,431	$112,753	$128,264	($63,212)	($313,116)
6	$0	435,535	$75,069	$4,486	$87,107	$104,842	$136,175	($83,327)	($396,443)
7	$0	433,358	$77,321	$4,464	$86,672	$96,443	$144,574	($81,488)	($477,930)
8	$0	431,191	$79,641	$4,441	$86,238	$87,526	$153,491	($79,579)	($557,509)
9	$0	429,035	$82,030	$4,419	$85,807	$78,059	$162,958	($77,599)	($635,108)
10	$0	426,890	$84,491	$4,397	$64,033	$68,008	$173,009	($96,889)	($731,997)
11	$0	424,755	$87,026	$4,375	$63,713	$57,337	$183,680	($94,653)	($826,650)
12	$0	422,632	$89,637	$4,353	$63,395	$46,008	$195,009	($92,339)	($918,989)
13	$0	420,518	$92,326	$4,331	$63,078	$33,980	$207,037	($89,945)	($1,008,934)
14	$0	418,416	$95,095	$4,310	$41,842	$21,211	$219,806	($108,390)	($1,117,323)
15	$0	416,324	$97,948	$4,288	$41,632	$7,654	$233,363	($105,724)	($1,223,047)
	Totals:	6,469,380	$1,204,380	$48,373	$1,236,199	$1,235,141	$2,380,113	($1,223,047)	($8,839,038)

Net Present Value (NPV) **($896,672)**