

WATCHUNG BOARD OF EDUCATION

VALLEY VIEW SCHOOL

**50 VALLEY VIEW ROAD
WATCHUNG, NEW JERSEY 07069**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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

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

Natural Gas Utility Provider: PSE&G
Utility Rate Structure: Large Volume Gas (LVG)
Third Party Supplier: Direct Energy/South Jersey Energy Company

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

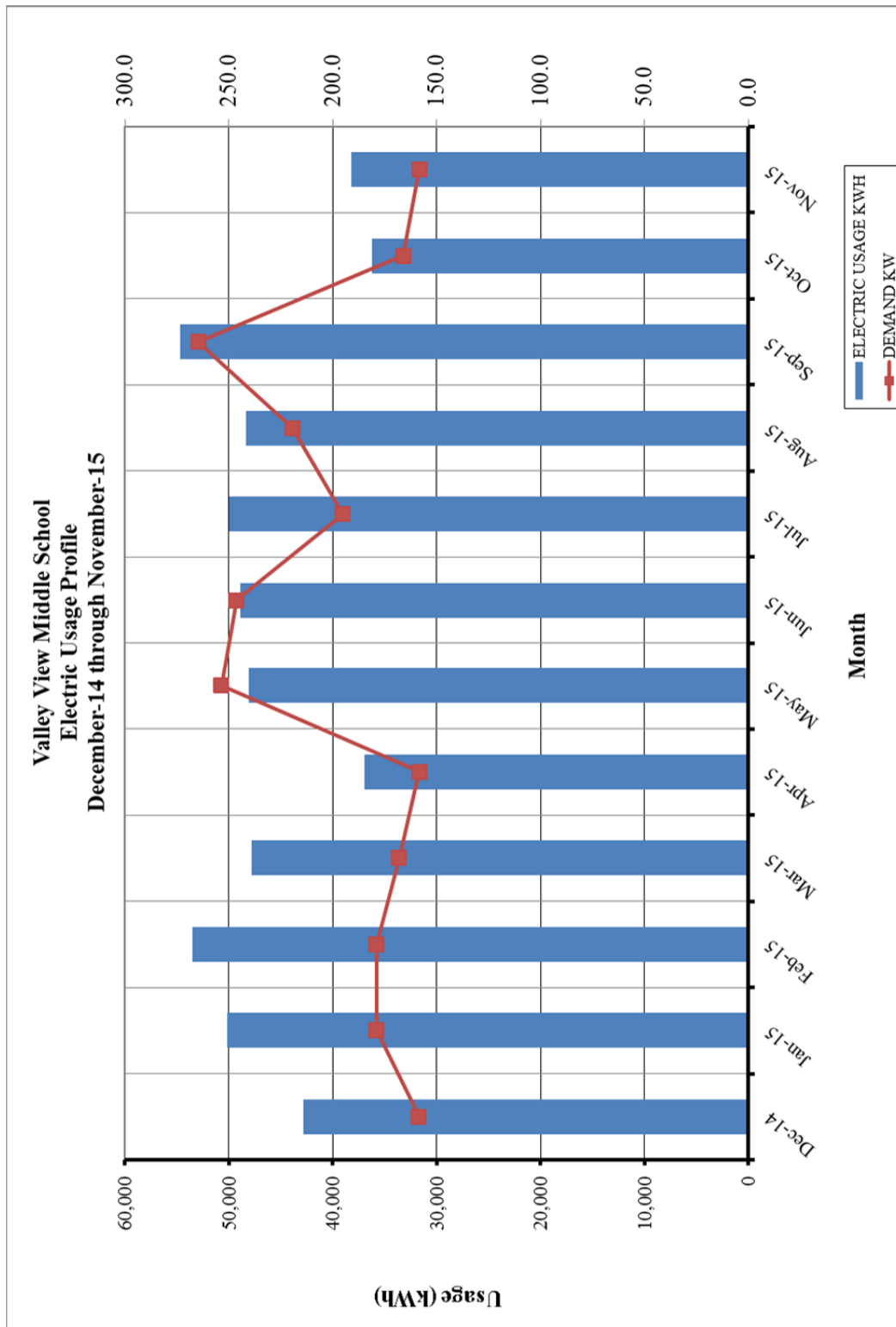
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The Watchung Board of Education investigated installing PV arrays at the Valley View School. It was discovered by the Structural Engineer that the existing roof (including the 2003 expansion) did not have enough residual capacity to safely support the additional weight of any PV array. The west side of the property at the parking lot was also considered for a carport PV system but the parking lot is shaded throughout a substantial portion of the day. Finally, a PV canopy over the courtyard (due to expensive structural supports) at the roof elevation was deemed cost prohibitive and did not produce a satisfactory ROI.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: LPLS			
Meter No: 9212175			
Account No: 42 003 439 08			
Third Party Utility Provider: Direct Energy			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Dec-14	42,804	158.7	\$6,480
Jan-15	50,126	178.9	\$7,503
Feb-15	53,532	179.1	\$7,945
Mar-15	47,815	168.2	\$7,166
Apr-15	36,978	158.4	\$5,969
May-15	48,070	253.6	\$8,153
Jun-15	48,902	246.5	\$10,317
Jul-15	49,965	195.4	\$9,831
Aug-15	48,352	219.5	\$9,720
Sep-15	54,729	264.8	\$11,173
Oct-15	36,214	166.1	\$5,936
Nov-15	38,211	158.4	\$6,158
Totals	555,698	264.8 Max	\$96,351
AVERAGE DEMAND		195.6 KW average	
AVERAGE RATE		\$0.173 \$/kWh	

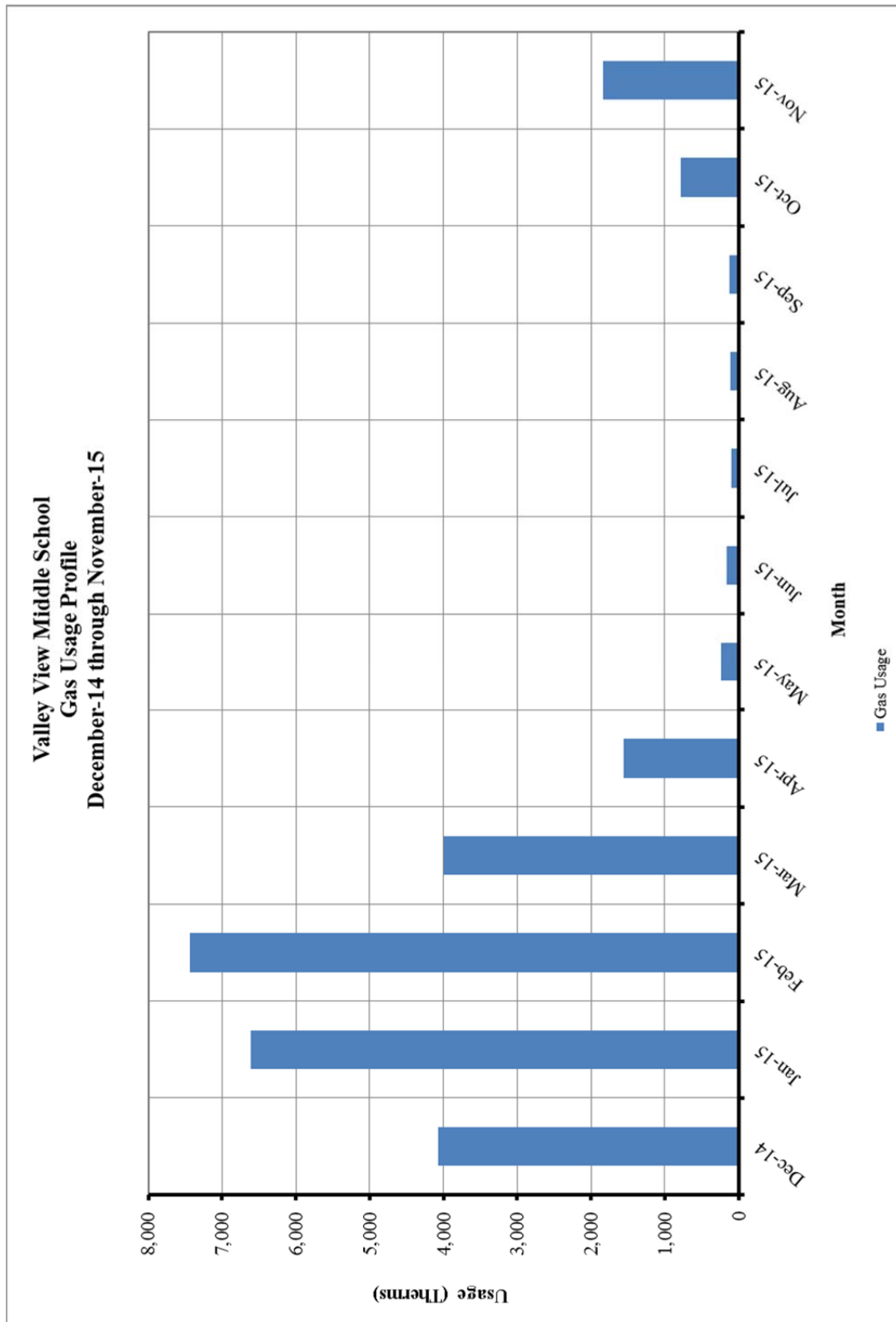
**Figure 1
Electricity Usage Profile**



**Table 2
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: LVG		
Meter No: 2679381		
Account No: 42 003 439 08		
Third Party Utility Provider: South Jersey Energy Company		
TPS Meter No: -		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Dec-14	4,073.36	\$3,672.94
Jan-15	6,606.96	\$5,586.56
Feb-15	7,433.33	\$5,861.24
Mar-15	3,992.75	\$3,311.16
Apr-15	1,561.63	\$951.11
May-15	237.92	\$232.72
Jun-15	155.91	\$190.59
Jul-15	100.98	\$159.94
Aug-15	105.48	\$162.75
Sep-15	125.09	\$175.24
Oct-15	784.29	\$526.94
Nov-15	1,837.61	\$1,982.18
TOTALS	27,015.30	\$22,813.37
AVERAGE RATE:	\$0.84	\$/THERM

**Figure 2
Natural Gas Usage Profile**



II. FACILITY ENERGY USE INDEX (EUI)

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

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

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

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

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

**Table 3
Energy Use Index Summary**

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	555,698.0			1,897,153	3.140	5,957,060
NATURAL GAS		27,015.3		2,701,530	1.050	2,836,606
TOTAL				4,598,683		8,793,667
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document.						
AUDITED BUILDING				PEER COMPARISON		
BUILDING TYPE	Education			Education		
BUILDING AREA	81,061	SQUARE FEET				
BUILDING SITE EUI	56.73	kBtu/SF/YR		58.2	kBtu/SF/YR	
BUILDING SOURCE EUI	108.48	kBtu/SF/YR		141.5	kBtu/SF/YR	
		23%	More Efficient than PEER Comparison			

III. FACILITY DESCRIPTION

The Valley View Middle School is located at 50 Valley View Road in Watchung, New Jersey. This 81,063 SF facility was originally built in 1949 with additions in 1950, 1952, 1957 and 2003. A major HVAC upgrade was part of the 2003 addition with all equipment being replaced and interfaced to a Building Management System (BMS).

The building is a 1-story (common areas) and 2-story (classrooms) facility that is comprised of the Board of Education offices, Superintendent's office, Principal's Office, the main office, conference rooms, faculty room, technology office, MDF's, IDF's, small group study rooms, gym, locker rooms, computer room, teacher work room, all-purpose room/stage, music rooms, band room, media center, nurse's office, art room, industrial arts room, serving kitchen, boiler room, various storage/utility rooms, etc.

Occupancy Profile

The typical hours of operation for the school are Monday through Friday between 6:30 AM – 5:00 PM. The building is staffed until 11:30 PM but the occupancy shuts down at 5:00 PM except where an activity is scheduled. Those individual areas are programmed to run as needed while the rest of the facility would be on a night time setback schedule. Summer hours are from 7:00 AM – 4:30 PM. Approximate enrollment is 340 students with a staff of 50 people.

Building Envelope

Exterior walls for the building are masonry brick faced with a concrete block construction. The windows throughout the facility are in good condition. Typical windows and doors are double-pane with aluminum frames.

The roofing systems include A-frame roofs with shingles over vapor barrier; a black EPOM membrane roofing system, 2" to 5" of rigid insulation, and a continuous vapor barrier; and modified bitumen roofing over rigid insulation (R-11) with a white rubberized cover.

HVAC Systems

In general, the school HVAC system consists of three (3) modular, condensing, hot water boilers; an air-cooled chiller; two (2) dual-temperature water pumps; one (1) chilled water pump with heat exchanger; eleven (11) packaged rooftop units; one dual temperature central air handling unit; vertical/horizontal unit ventilators; and numerous unit heaters, hot water convectors, roof exhaust fans and mini-split condensers.

The heating hot water system located in the boiler room includes three (3) Aerco Model BMK-2.0 GWB boilers each rated at 2,000 MBH input with a maximum thermal efficiency of 92%.

The heating hot water is pumped to the various hot water coils throughout the facility by two (2) Bell & Gossett Series 1510 BF dual-temperature, base-mounted, double-suction, centrifugal pumps. Each of these pumps has a flow of 430 GPM at 60 feet of TDH and a 10-HP Marathon

motor with an efficiency of 89.5%. Each of these two pumps is controlled by a variable speed drive manufactured by Cutler-Hammer Model HV9000.

The chilled water system is comprised of a Trane Model RTAC 200A Air-Cooled Series R™ Rotary Liquid Chiller that serves the classrooms. This air-cooled rooftop unit is rated at a nominal 200-Tons with an efficiency of 1.22 kW/Ton. The chilled water is pumped by a Bell & Gossett Series 1510 BF dual-temperature, base-mounted, double-suction, centrifugal pump. This pump has a flow of 430 GPM at 60 feet of TDH and a 10-HP Marathon motor with an efficiency of 89.5%.

The Board of Education offices are heated and cooled by a Trane Model YCD180B packaged rooftop unit with a heating capacity of 250 to 350 MBH and a cooling capacity of 15 tons. The gym is heated by a Des Champs Model PV-MZP-8707 energy recovery unit with a gas-fired heating capacity of 280 MBH. The gym is not cooled.

The all-purpose room/stage is heated by two (2) Trane Model YSC120A packaged gas-fired heating and Dx cooling units that are rated at 10 tons of cooling capacity and 150 to 250 MBH of heating. In addition, two (2) Aeon Model RK-13-2 packaged Dx cooling units rated at 13 tons of cooling each provide additional cooling capacity.

The first floor music rooms are heated and cooled by a Trane Model YCD180B packaged rooftop unit with a heating capacity of 250 to 350 MBH and a cooling capacity of 15 tons. The second floor music rooms are heated and cooled by a Trane Model YSC120A packaged rooftop unit with a heating capacity of 150 to 250 MBH and a cooling capacity of 10 tons.

The media center is heated and cooled by a Trane Model YCD150D packaged rooftop unit with a heating capacity of 150 to 250 MBH and a cooling capacity of 12.5 tons. The corridors are heated and cooled by a Trane Model YCD180B packaged rooftop unit with a heating capacity of 250 to 350 MBH and a cooling capacity of 15 tons.

The locker rooms and coach's office are heated by a Trane Model GRCA25PDM gas-fired rooftop unit that is rated at 250 MBH. The locker rooms and coach's office are not cooled.

The classrooms are heated, cooled and ventilated by Trane Model VUV-B and HUV-B unit ventilators that have hot water heating and chilled water cooling. These unit ventilators are rated from 750 CFM to 1,500 CFM; heating capacity from 16.2 to 79.4 MBH; and from 16.2 to 66.7 MBH of cooling capacity. The vertical units in some of the classrooms are interlocked with the Trane Model EUV wall exhausters.

The stairwells, entrance vestibules, restrooms and hallways are heated by various electric unit heaters and hot water convectors. The Industrial Arts Room is heated and cooled by a Trane Model MCCB008 central air handler rated at 235 MBH of heating capacity and 171 MBH of cooling.

Fresh air is supplied to most of the spaces via the rooftop units, roof-mounted air intake housings, etc. Outside air intake louvers provide fresh air for the boiler room, mechanical rooms, and other spaces.

There are various split condensing units that cool the Superintendent's office, BOE Conference Room and IT closet ranging in size from 1.5 to 3 tons of cooling with an efficiency of 12.0 SEER to 16.0 SEER manufactured by EMI and Fujitsu.

Exhaust System

Air is exhausted from many areas in the school via rooftop, up-blast/down-blast fans that range in size from 200 CFM to 2,100 CFM. There are also numerous smaller fans that range in size from 75 CFM to 95 CFM that serve individual restrooms.

HVAC System Controls

All the HVAC units are controlled by an Automated Logic Building Management System (BMS) that monitors and controls the building HVAC equipment through graphics; schedule and modify the HVAC operation; collect, view and analyze trend information for space temperature; equipment operation and other points; scheduling of equipment of occupied/unoccupied hours; night time setback for unoccupied spaces; and troubleshooting of the HVAC equipment. The boilers are controlled by an Aerco boiler management system that includes outside air temperature reset.

Domestic Hot Water

The domestic hot water heater located in the Building & Grounds office is a Bradford White Model DM80T1993N gas-fired domestic water heater rated at 199,999 BTUH input with an 80-gallon capacity, a thermal efficiency of 80% and a recovery of 193.9 gallons per hour.

Plumbing System

In 2009, most of the restrooms were upgraded to low-flow sinks, toilets and urinals. The school utilizes sinks rated at 0.5 gallons per minute. Additionally, toilets and urinals located in the restroom areas have a rating of 1.6 and 1.0 gallons per flush, respectively. There are also waterless urinals in one of the student restrooms.

Kitchen

The serving kitchen includes a Garland convection oven, a True reach-in refrigerator, a Delfield reach-in freezer, three (3) Beverage Air beverage refrigerators, and an Electrolux residential refrigerator. All of the refrigerators at the facility are less than 7 years old and are rated high in energy performance.

Lighting

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

IV. MAJOR EQUIPMENT LIST

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

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

V. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Interior Lighting Upgrades	\$134,178	\$19,669	6.8	119.9%
ECM #2	Interior Lighting Controls	\$31,885	\$2,824	11.3	32.9%
ECM #3	Exterior Lighting Upgrades	\$7,415	\$1,846	4.0	273.4%
ECM #4	High-Efficiency Air-Cooled Chiller	\$259,919	\$4,617	56.3	-55.6%
ECM #5	High-Efficiency Gas-Fired Domestic Water Heater	\$24,800	\$738	33.6	-55.4%
ECM #6	De-Stratification Fans for APR	\$8,000	\$255	31.4	-52.2%
ECM #7	EC Motors for Small Exhaust Fans	\$4,830	\$284	17.0	-11.8%
ECM #8	Vending Miser Controls	\$1,650	\$906	1.8	723.6%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.

**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	Interior Lighting Upgrades	44.1	114,351	0
ECM #2	Interior Lighting Controls	0.0	16,419	0
ECM #3	Exterior Lighting Upgrades	3.6	10,734	0
ECM #4	High-Efficiency Air-Cooled Chiller	27.7	26,843	0
ECM #5	High-Efficiency Gas-Fired Domestic Water Heater	0.0	0	878
ECM #6	De-Stratification Fans for APR	0.0	-224	349
ECM #7	EC Motors for Small Exhaust Fans	0.0	1,652	0
ECM #8	Vending Miser Controls	0.0	5,269	0

**Table 3
ECM Emissions Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	GREENHOUSE GAS EMISSIONS REDUCTION		
		CO₂ EMISSIONS (LBS)	NO_x EMISSIONS (LBS)	SO₂ EMISSIONS (LBS)
ECM #1	Interior Lighting Upgrades	173,814	320	743
ECM #2	Interior Lighting Controls	24,957	46	107
ECM #3	Exterior Lighting Upgrades	16,316	30	70
ECM #4	High-Efficiency Air-Cooled Chiller	40,801	75	174
ECM #5	High-Efficiency Gas-Fired Domestic Water Heater	10,273	8	0
ECM #6	De-Stratification Fans for APR	3,743	3	(1)
ECM #7	EC Motors for Small Exhaust Fans	2,511	5	11
ECM #8	Vending Miser Controls	8,009	15	34
	Total Emissions Savings	280,423	501	1,138

Notes: A. Emissions Reduction based on NJCEP published factors for electric & gas.

**Table 4
Facility Project Summary**

FACILITY PROJECT SUMMARY TABLE					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Interior Lighting Upgrades	\$19,669	\$145,743	\$11,565	\$134,178	6.8
Interior Lighting Controls	\$2,824	\$32,950	\$1,065	\$31,885	11.3
Exterior Lighting Upgrades	\$1,846	\$7,955	\$540	\$7,415	4.0
High-Efficiency Air-Cooled Chiller	\$4,617	\$292,719	\$32,800	\$259,919	56.3
High-Efficiency Gas-Fired Domestic Water Heater	\$738	\$25,000	\$200	\$24,800	33.6
De-Stratification Fans for APR	\$255	\$8,000	\$0	\$8,000	31.4
EC Motors for Small Exhaust Fans	\$284	\$4,830	\$0	\$4,830	17.0
Vending Miser Controls	\$906	\$1,650	\$0	\$1,650	1.8
Total Project	\$31,139	\$518,847	\$46,170	\$472,677	15.2

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

The facility peak electrical demand and total project savings does not meet the qualifications for the Pay for Performance Program since the lighting upgrade savings is greater than 50% of the total energy savings for the facility.

ECM #1: Lighting Upgrade – Interior

Description:

The majority of the interior lighting throughout the Valley View School is provided by 2x2, 1x4, 2x4 fluorescent fixtures with newer generation T8 lamps in addition to various incandescent, CFL, and LED lamps and fixtures. It is recommended that all fixtures within the building be replaced with LED equivalent tube lamps, screw-in bulbs, and new LED fixtures where appropriate. No action is recommended for the gymnasium lighting.

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

Energy Savings Calculations:

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

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	44.1
Electric Usage Savings (kWh)	114,351
Electric Cost Savings (\$)	\$19,669

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$145,743
NJ Smart Start Equipment Incentive (\$):	\$11,565
Net Installation Cost (\$):	\$134,178
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$19,669
Total Yearly Savings (\$/Yr):	\$19,669
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.8
Simple Lifetime ROI	119.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$295,035
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	\$100,629.25

ECM #2: Interior Lighting Controls Upgrade

Description:

Sometimes lights in a facility are left on unnecessarily. In many cases the lights may be left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. In some instances lights might be left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. In addition, daylight control systems can be implemented using daylighting control systems that dim the electric lighting in response to interior daylight levels. The light output of the fluorescent lamps (T8) is varied by using electronic dimming ballasts. Photosensors, typically mounted in the ceiling, are used to measure the quantity of daylight in the space then determine the amount of dimming required to maintain adequate lighting levels in the total space.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes installation of ceiling or switch-mount sensors for the break rooms, conference rooms, offices, and restrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls which can be implemented in this ECM and outlines the proposed lighting/daylighting controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

LIGHTING CONTROLS SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	0.0
Electric Usage Savings (kWh)	16,419
Electric Cost Savings (\$)	\$2,824

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

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

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$32,950
NJ Smart Start Equipment Incentive (\$):	\$1,065
Net Installation Cost (\$):	\$31,885
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,824
Total Yearly Savings (\$/Yr):	\$2,824
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.3
Simple Lifetime ROI	32.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$42,360
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	\$1,827.73

ECM #3: Exterior Lighting Upgrade**Description:**

The exterior lighting at the Valley View School includes exterior building lighting only. The exterior of the building is currently lit by metal halide wall packs; and incandescent A-lamps. Concord Engineering recommends upgrading all of the exterior lighting to an energy-efficient lighting system that includes LED bulbs and LED wall packs.

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

Energy Savings Calculations:

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

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	3.6
Electric Usage Savings (kWh)	10,734
Electric Cost Savings (\$)	\$1,846

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$7,955
NJ Smart Start Equipment Incentive (\$):	\$540
Net Installation Cost (\$):	\$7,415
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,846
Total Yearly Savings (\$/Yr):	\$1,846
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.0
Simple Lifetime ROI	273.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$27,690
Internal Rate of Return (IRR)	24%
Net Present Value (NPV)	\$14,622.43

ECM #4: Air-Cooled Chiller Replacement**Description:**

The existing air-cooled chiller serving the Valley View School is a 200 ton capacity Trane RTAC 200A air-cooled rotary chiller located on the roof of the facility. The chiller is approximately twelve (12) years old and has a full load efficiency of 9.6 EER and a part load efficiency of 13.3 EER.

This ECM would install one (1) new high efficiency air-cooled chiller with variable frequency drives on the compressors and a minimum EER of 11.5 with a part load efficiency of 20.7 EER.

Energy Savings Calculations:

$$\text{Electric Usage} = \text{Capacity (tons)} \times \frac{12,000 \text{ Btu}}{1000 \text{ W}} \times \frac{1}{\text{EER}} \times \text{Operating Hours}$$

$$\text{Demand Savings} = \text{Capacity (tons)} \times \left(\frac{1}{\text{EER}_{\text{Old}}} - \frac{1}{\text{EER}_{\text{New}}} \right) \times 67\% \text{ Capacity Factor}$$

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

CHILLER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Air Cooled Chiller	High Efficiency Chiller	
Operating Capacity (Tons)	200.0	200.0	
Chiller Efficiency (EER)	9.6	11.5	
Full Load Cooling Hrs (Est.)	400	400	
Cooling Energy (kWh)	100,000	83,478	
Chiller Operating Hours (Year Round)	800	800	
Chiller Part Load Hours Est.	400	400	
Chiller IPLV (EER)	13.3	20.7	
Chiller Part Load %	40.0%	40.0%	
Part Load Cooling Energy (kWh)	28,872	18,551	
Elec Cost (\$/kWh)	0.172	0.172	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Demand (KW)	167.5	139.8	27.7
Electric Energy (kWh)	128,872	102,029	26,843
Electric Energy Cost (\$)	\$22,166	\$17,549	\$4,617

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$292,719
NJ Smart Start Equipment Incentive (\$):	\$32,800
Net Installation Cost (\$):	\$259,919
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,617
Total Yearly Savings (\$/Yr):	\$4,617
Estimated ECM Lifetime (Yr):	25
Simple Payback	56.3
Simple Lifetime ROI	-55.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$115,425
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	(\$179,522.50)

ECM #5: High-Efficiency Gas-Fired Domestic Water Heater**Description:**

Domestic hot water for the Valley View School is provided by a Bradford White Model DM80T gas-fired domestic water heater rated at 200 MBH. This unit has a rated thermal efficiency of only 80% and a recovery of 193.9 gallons per hour. This water heater is less efficient than newer water heaters. Therefore, it is recommended that this domestic water heater be replaced.

This ECM would replace the existing gas-fired domestic water heater with a condensing gas-fired water heater with a 96% thermal efficiency.

Energy Savings Calculations:

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

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

$$\text{DHW Total Usage} = \frac{\text{DHW Heat Usage}}{\text{Heating Eff \%} \times \text{Fuel Heat Value} \left(\frac{\text{Btu}}{\text{Fuel Unit}} \right)}$$

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

DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Gas-Fired Water Heater	High Efficiency Water Heater	
Building Type	Education		
Building Square-foot	81,061	81,061	
Domestic Water Usage, kBtu	421,517.20	421,517.20	
DHW Heating Fuel Type	Gas	Gas	
Heating Efficiency	80%	96%	16%
Total Usage (kBtu)	526,897	439,080	87,816
Electric Cost (\$/kWh)	\$ 0.172	\$ 0.172	
Nat Gas Cost (\$/Therm)	\$ 0.840	\$ 0.840	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	0	0	0
Natural Gas Usage (Therms)	5,269	4,391	878
Energy Cost (\$)	\$4,426	\$3,688	\$738
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based off of RS Means Unit Cost data, vendor quotes, and local Mechanical Contractor estimates.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$25,000
NJ Smart Start Equipment Incentive (\$):	\$200
Net Installation Cost (\$):	\$24,800
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$738
Total Yearly Savings (\$/Yr):	\$738
Estimated ECM Lifetime (Yr):	15
Simple Payback	33.6
Simple Lifetime ROI	-55.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$11,070
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	(\$15,989.80)

ECM #6: De-Stratification Fans in the All Purpose Room**Description:**

The All Purpose Room (APR) has a 20-foot ceiling. In rooms with high ceilings typically stratification of heated air occurs, resulting in air at ceiling level being warmer than the floor. Since temperature at the floor level dictates the comfort of occupants and is typically the location of the thermostat controlling the system, this results in additional operating hours to satisfy space conditions. A de-stratification fan continuously mixes the air, balancing temperatures from ceiling to floor and wall to wall which helps the HVAC system maintain the desired temperature.

This ECM would install two (2) Airius Model A45-EC de-stratification fans with 92% efficient fan motors in the APR to be suspended from the ceiling, with all required electrical wiring and supports. These fans can be tied into the BMS or wall-mounted potentiometers. These fans should only operate during heating season to help maintain a higher floor temperature and reduce cycling time.

Energy Savings Calculations:

The calculations are based on the manufacturer's percent savings utilizing the height of the ceiling and associated temperature differential between floor and ceiling. The temperature differential in this case was estimated at 8.5 degrees Fahrenheit.

$$\text{Heating Energy (kBtu)} = 80\% \text{ Oversize Factor} \times \text{Space Heating Capacity} \times \text{HDD} \times \text{Adj. Factor} \times 24 \frac{\text{hr}}{\text{day}} \times \frac{1}{\text{Design } \Delta T} \times \frac{1}{\text{Efficiency}}$$

$$\text{Savings (kBtu)} = \text{Heating Energy} \times \text{Percent Savings}$$

$$\text{Fan Power Penalty (kWh)} = \text{Fan Power (W)} \times \text{Winter Operating Hours} \times \frac{1 \text{ kWh}}{1,000 \text{ W}}$$

Each A45 unit has an 85-watt fan motor.

DESTRATIFICATION FAN ANALYSIS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Description	Existing All Purpose Room	Proposed Room w/ De-Stratification Fans	
Space Heating Type	Gas-Fired Rooftop Unit	Gas-Fired Rooftop Unit	
Space Heating Capacity (MBH)	300	300	
Heating Efficiency (%)	81%	81%	
Heating Degree Days (65 F)	5062	5062	
Degree Day Adjustment Factor	0.45	0.45	
Space Ceiling Height (ft)	20	20	
Ceiling-Floor ΔT ($^{\circ}F$)	8.5	8.5	
Percent Energy Savings	-	22%	
Destrat Fan Power (kWh)	-	224	
Heating Energy (kBtu)	158,808	123,870	
Electric Rate (\$/kWh)	\$0.172	\$0.172	
Natural Gas (\$/Therm)	\$0.84	\$0.84	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	0	224	(224)
Natural Gas (Therms)	1,588	1,239	349
Energy Cost (\$)	\$1,334	\$1,079	\$255

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$8,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$8,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$255
Total Yearly Savings (\$/Yr):	\$255
Estimated ECM Lifetime (Yr):	15
Simple Payback	31.4
Simple Lifetime ROI	-52.2%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$3,825
Internal Rate of Return (IRR)	-8%
Net Present Value (NPV)	(\$4,955.83)

ECM #7: EC Motors on Small Rooftop Exhaust Fans**Description:**

Electronically Commutated (EC) Motors are proven to generate substantial savings on small motor applications. These motors currently are available in sizes up to 1 horsepower, and provide efficiencies similar to how NEMA premium efficiency motor would at a large horsepower. The motor works much like a direct current (DC) motor and is without mechanical brushes and the commutator reduces friction losses in the motor. The motors are programmable and can be used for a wide range of applications.

This measure would replace the existing fan motors in the rooftop exhaust fans with fractional horsepower. In total, there is one (1) 1/2 HP motors and three (3) 1/4 HP motors.

Energy Savings Calculations:

Measured savings for ECM motors has proven that up to 65% reduction in power can be realized through the installation these motors.

$$\text{Electric Energy (kWh)} = \frac{(\text{Amps} \times \text{Volts} \times \text{Phase}^{1/2})}{1000} \times \text{Power Factor} \times \text{Operating Hours}$$

$$\text{Energy Savings} = \text{Electric Energy} \times \text{Power Reduction (40\%)}$$

Energy Savings Calculations for Each Size Exhaust Fan Motor:

ELECTRONICALLY COMMUTATED MOTOR CALCULATION			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	PSC	EC Motor	
Quantity of Motors	1	1	
Motor Nameplate HP	1/2	1/2	
Full Load Amps	9.8		
Voltage	115	115	
Phase	1	1	
Power Factor	55%	55%	
Operating Hrs	2400	2400	
Load Reduction	-	40.0%	
Elec Cost (\$/kWh)	0.172	0.172	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Energy (kWh)	1,488	893	595
Electric Energy Cost (\$)	\$256	\$154	\$102
COMMENTS:	Rooftop Exhaust Fans		

ELECTRONICALLY COMMUTATED MOTOR CALCULATION			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	PSC	EC Motor	
Quantity of Motors	3	3	
Motor Nameplate HP	1/4	1/4	
Full Load Amps	5.8		
Voltage	115	115	
Phase	1	1	
Power Factor	55%	55%	
Operating Hrs	2400	2400	
Load Reduction	-	40.0%	
Elec Cost (\$/kWh)	0.172	0.172	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Energy (kWh)	2,641	1,585	1,057
Electric Energy Cost (\$)	\$454	\$273	\$182
COMMENTS:	Rooftop Exhaust Fan		

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based on RS Means Unit Cost Data and local contractor pricing.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$4,830
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$4,830
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$284
Total Yearly Savings (\$/Yr):	\$284
Estimated ECM Lifetime (Yr):	15
Simple Payback	17.0
Simple Lifetime ROI	-11.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$4,260
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	(\$1,439.63)

ECM #8: Vending Miser Controls

Description:

The Valley View Middle School currently utilizes vending machines in select areas within the building. Vending machines are located in the faculty lounge and in the snack area of the kitchen 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 two (2) systems for the cold beverage machines and one (1) system for the snack machine.

Energy Savings Calculations:

Cold Drink and Snack Vending Machine Energy Conservation			
		Input Variables	
Energy Analysis Prepared For:	Energy Costs (\$0.000 per kwh)		\$0.173
	Facility Occupied Hours per Week		40
Valley View	Number of Cold Drink Vending Machines		2
	Number of Uncooled Snack Machines		1
www.VendingMiserStore.com	Power Requirements of Cold Drink Machine (avg watts)		427
	Power Requirements of Snack Machine (avg watts)		80
	VendingMiser Sale Price (for cold drink machines)		\$600.00
	OfficeMiser Sale Price (for snack machines)		\$450.00
Savings Analysis			
	Before	After	
Cold Drink Machines	\$1,295.11	\$475.63	Cost of Operation
	7,486	2,749	kWh
		63%	% Energy Savings
Snack Machines	\$120.91	\$28.79	Cost of Operation
	699	166	kWh
		76%	% Energy Savings
Project Summary			
Present kWh	Projected kWh	kWh Savings per Year	
8,185	2,916	5,269	
Present Cost	Projected Costs	Annual Savings	Per Cent Savings
\$1,416.01	\$504.42	\$911.59	64%
			Total Project Cost
			\$1,650.00
			Break Even (Months)
			21.7

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,650
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$1,650
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$906
Total Yearly Savings (\$/Yr):	\$906
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.8
Simple Lifetime ROI	723.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$13,590
Internal Rate of Return (IRR)	55%
Net Present Value (NPV)	\$9,165.77

VI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off computers when not in use. Ensure computers are not running in screen saver mode.
- F. Replace any old CRT Monitors with LED/LCD Type Monitors, which can draw as much as a quarter the power of an equivalent CRT monitor.
- G. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING

Watchung Board of Education - Valley View 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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/yr)	(\$/yr)	(\$/yr)		(Yr)	(\$)	(\$)	(%)	(Yr)	(\$)
ECM #1	Interior Lighting Upgrades	\$90,900	\$54,843	\$11,565	\$134,178	\$19,884	\$0	\$19,884	15	\$298,260	\$0	122.3%	6.7	12.17%	\$103,195.90
ECM #2	Interior Lighting Controls	\$26,300	\$6,650	\$1,065	\$31,885	\$2,840	\$0	\$2,840	15	\$42,600	\$0	33.6%	11.2	3.86%	\$2,018.74
ECM #3	Exterior Lighting Upgrades	\$4,440	\$3,515	\$540	\$7,415	\$1,755	\$0	\$1,755	15	\$26,325	\$0	255.0%	4.2	22.55%	\$13,536.08
ECM #4	High-Efficiency Air-Cooled Chiller	\$174,500	\$118,219	\$32,800	\$259,919	\$4,644	\$0	\$4,644	25	\$116,100	\$0	-55.3%	56.0	-5.43%	(\$179,052.34)
ECM #5	High-Efficiency Gas-Fired Domestic Water Heater	\$15,000	\$10,000	\$200	\$24,800	\$738	\$0	\$738	15	\$11,070	\$0	-55.4%	33.6	-8.72%	(\$15,989.80)
ECM #6	De-Stratification Fans for APR	\$5,000	\$3,000	\$0	\$8,000	\$255	\$0	\$255	15	\$3,825	\$0	-52.2%	31.4	-8.07%	(\$4,955.83)
ECM #7	EC Motors for Small Exhaust Fans	\$2,400	\$2,430	\$0	\$4,830	\$286	\$0	\$286	15	\$4,290	\$0	-11.2%	16.9	-1.45%	(\$1,415.75)
ECM #8	Vending Miser Controls	\$1,050	\$600	\$0	\$1,650	\$912	\$0	\$912	15	\$13,674	\$0	728.7%	1.8	55.17%	\$9,232.50

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2013

Gas Cooling

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

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Hot Water Gas Fired Boilers < 300 MBH	Non-Condensing: \$0.95 per MBH, Minimum \$400 per unit Condensing: \$2.00 per MBH, Minimum \$1000 per unit
Hot Water Gas Fired Boilers ≥ 300 - 1500 MBH	Non-Condensing: \$1.75 per MBH Condensing: \$2.20 per MBH Minimum \$1000 per unit
Hot Water Gas Fired Boilers >1500 - ≤ 2500 MBH	Non-Condensing: \$1.50 per MBH Condensing: \$2.20 per MBH
Hot Water Gas Fired Boilers >2500 - ≤ 4000 MBH	Non-Condensing: \$1.30 per MBH Condensing: \$2.00 per MBH
Steam, Except Natural Draft, Gas fired Boilers < 300 MBH	\$1.40 per MBH, Minimum \$400 per unit
Steam, Except Natural Draft, Gas fired Boilers ≥ 300 – 1500 MBH	\$1.20 per MBH
Steam, Except Natural Draft, Gas fired Boilers > 1500 – 2500 MBH	\$1.20 per MBH
Steam, Except Natural Draft, Gas fired Boilers > 2500 – 4000 MBH	\$1.00 per MBH
Steam, Natural Draft < 300 MBH	\$1.40 per MBH, Minimum \$300 per unit
Steam, Natural Draft ≥ 300 - 1500 MBH	\$1.00 per MBH
Steam, Natural Draft >1500 - ≤ 2500 MBH	\$0.90 per MBH
Steam, Natural Draft >2500 - ≤ 4000 MBH	\$0.70 per MBH
All Types Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	\$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	\$1,200 - \$2,700
Low Intensity Infrared Heating	\$300 - \$500 per unit

Natural Gas Water Heating

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

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

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

Prescriptive Lighting

T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	\$5 per fixture
T-5 and T-8 High Bay Fixtures	\$25 - \$150 per fixture
HID \geq 100w Replace with new induction fixture. (must be 30% less watts/fixture than HID system)	\$70 per fixture
HID \geq 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture

Prescriptive Lighting - LED

LED Architectural Floor and Spot Luminaires	\$50 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Display Case Lighting	\$30 per display case
LED Fuel Pump Canopy	\$100 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	\$150 per fixture
LED High-Bay-Aisle Lighting	\$150 per fixture
LED Linear Ambient Luminaires (Indirect, Indirect/Direct, Direct/Indirect, Direct)	2' Fixtures - \$20/fixture 3' Fixtures - \$30/fixture 4' Fixtures - \$45/fixture 6' Fixtures - \$60/fixture 8' Fixtures - \$75/fixture
LED Linear Replacement Lamps (2' & 4' only)	\$5 per lamp
Luminaires for Ambient Lighting of Interior Commercial Spaces (1x4, 2x2, 2x4 New Fixtures and Retrofit Kits)	1x4 LED - \$15 per fixture 2x2 LED - \$15 per fixture 2x4 LED - \$25 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$100 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$50 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Retrofit Kits for Large Outdoor Pole / Arm-Mounted Area and Roadway Luminaires	\$150 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$30 per 4 foot \$42 per 5 foot \$65 per 6 foot
LED Shelf-Mtd. Display & Task Lights	\$15 per linear foot

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

Lighting Controls – Occupancy Sensors

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

Refrigeration Doors/Covers

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

Refrigeration Controls

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

Refrigerator / Freezer Case Premium Efficiency Motors

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

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

Other Equipment Incentives

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

APPENDIX C



LEARN MORE AT
energystar.gov

ENERGY STAR[®] Statement of Energy Performance

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ENERGY STAR[®]
Score¹

Valley View Middle School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 81,061
Built: 1949

For Year Ending: November 30, 2015
Date Generated: February 04, 2016

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

Property & Contact Information

Property Address

Valley View Middle School
50 Valley View Road
Watchung, New Jersey 07069

Property Owner

Watchung Board of Education
One Dr. Parenty Way
Watchung, NJ 07069
(____)____-____

Primary Contact

Irfan Evcil
One Dr. Parenty Way
Watchung, NJ 07069
(908) 755-8536
ievcil@watchungschools.us

Property ID: 4778055

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

56 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu) 1,896,815 (42%)
Natural Gas (kBtu) 2,641,627 (58%)

National Median Comparison

National Median Site EUI (kBtu/ft²) 66.5
National Median Source EUI (kBtu/ft²) 127.9
% Diff from National Median Source EUI -16%

Source EUI

107.7 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO₂e/year) 394

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

,
(____)____-____



**Professional Engineer Stamp
(if applicable)**



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energystar.gov

ENERGY STAR® Data Verification Checklist

68

ENERGY STAR®
Score¹

Valley View Middle School

Registry Name: Valley View Middle School

Primary Function: K-12 School

Gross Floor Area (ft²): 81,061

Built: 1949

For Year Ending: 11/30/2015

Date Generated: 02/04/2016

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

Property & Contact Information

Property Address

Valley View Middle School
50 Valley View Road
Watchung, New Jersey 07069

Property ID: 4778055

Property Owner

Watchung Board of Education
One Dr. Parenty Way
Watchung, NJ 07069
(____)____-____

Primary Contact

Irfan Evcil
One Dr. Parenty Way
Watchung, NJ 07069
(908) 755-8536
ievcil@watchungschools.us

1. Review of Whole Property Characteristics

Basic Property Information

1) Property Name: Valley View Middle School

Is this the official name of the property?

Yes No

If "No", please specify: _____

2) Primary Function: K-12 School

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

Yes No

3) Location:

50 Valley View Road
Watchung, New Jersey 07069

Is this correct and complete?

Yes No

4) Gross Floor Area: 81,061 ft²

Yes No

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

5) Average Occupancy: 100

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

Yes No

6) Number of Buildings: 1

Does this number accurately represent all structures?

Yes No

Notes:

Indoor Environmental Standards

1) Ventilation for Acceptable Indoor Air Quality

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

Yes No

2) Acceptable Thermal Environmental Conditions

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

Yes No

3) Adequate Illumination

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

Yes No

Notes:

2. Review of Property Use Details

K-12 School: Building Use

★ This Use Detail is used to calculate the 1-100 ENERGY STAR Score.

★ **1) Gross Floor Area: 81,061 ft²**

Is this the total size, as measured between the principal exterior surfaces of the enclosing fixed walls of the building(s)? This includes all areas inside the building(s) such as: occupied tenant areas, common areas, meeting areas, break rooms,

Yes No

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

2) Gymnasium Floor Area: 7,700 ft²

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

Yes No

★ 3) High School: No

Is the property a high school (teaching grades 10, 11, and/or 12)? If the property teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.

Yes No

4) Number of Workers on Main Shift: 50

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

Yes No

5) Student Seating Capacity: 340

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

Yes No

6) Months in Use: 12

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

Yes No

★ 7) Weekend Operation: No

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

Yes No

★ 8) Number of Computers: 91

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

Yes No

★ 9) Cooking Facilities: 100% Yes

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

Yes No

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

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

Yes No

★ 11) **Percent That Can Be Heated: 100**

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

Yes No

★ 12) **Percent That Can Be Cooled: 90**

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

Yes No

13) **School District: Watchung**

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

Yes No

Notes:

3. Review of Energy Consumption

Data Overview

Site Energy Use Summary

Electric - Grid (kBtu) 1,896,814.6 (42%)
 Natural Gas (kBtu) 2,641,626.9 (58%)
 Total Energy (kBtu) 4,538,441.5

Energy Intensity

Site (kBtu/ft²) 56
 Source (kBtu/ft²) 107.7

National Median Comparison

National Median Site EUI (kBtu/ft²) 66.5
 National Median Source EUI (kBtu/ft²) 127.9
 % Diff from National Median Source EUI -15.8%

Emissions (based on site energy use)

Greenhouse Gas Emissions (Metric Tons CO₂e) 394.2

Power Generation Plant or Distribution Utility:

Public Service Electric & Gas Co

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

Summary of All Associated Meters

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

Meter Name	Fuel Type	Start Date	End Date	Associated With
Natural Gas	Natural Gas	10/28/2014	In Use	Valley View Middle School
Electric Grid Meter	Electric	10/31/2014	In Use	Valley View Middle School

Total Energy Use

Yes No

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

Additional Fuels

Yes No

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

On-Site Solar and Wind Energy

Yes No

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

Notes:

Natural Gas Meter: Natural Gas (therms)

Associated With: Valley View Middle School

Start Date	End Date	Usage
11/26/2014	12/30/2014	4,073.4
12/30/2014	01/29/2015	6,607
01/29/2015	03/02/2015	7,433.3
03/02/2015	03/31/2015	3,992.7
03/31/2015	04/30/2015	1,561.6
04/30/2015	06/01/2015	237.9
06/01/2015	06/30/2015	155.9
06/30/2015	07/30/2015	101
07/30/2015	08/28/2015	105.5
08/28/2015	09/29/2015	125.1

Start Date	End Date	Usage
09/29/2015	10/28/2015	784.3
10/28/2015	11/30/2015	1,837.6
Total Consumption (therms):		27,015.3
Total Consumption (kBtu (thousand Btu)):		2,701,530

Total Energy Consumption for this Meter

Yes No

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

Notes:

Electric Meter: Electric Grid Meter (kWh (thousand Watt-hours))

Associated With: Valley View Middle School

Start Date	End Date	Usage	Green Power?
10/31/2014	12/02/2014	44,303	No
12/02/2014	01/02/2015	42,804	No
01/02/2015	02/02/2015	50,126	No
02/02/2015	03/04/2015	53,532	No
03/04/2015	04/02/2015	47,815	No
04/02/2015	05/04/2015	36,978	No
05/04/2015	06/03/2015	48,070	No
06/03/2015	07/02/2015	48,902	No
07/02/2015	08/03/2015	49,965	No
08/03/2015	09/01/2015	48,352	No
09/01/2015	10/01/2015	54,729	No
10/01/2015	10/30/2015	36,214	No
10/30/2015	12/02/2015	38,211	No
Total Consumption (kWh (thousand Watt-hours)):			600,001
Total Consumption (kBtu (thousand Btu)):			2,047,203.4

Total Energy Consumption for this Meter

Yes No

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

Notes:

4. Signature & Stamp of Verifying Licensed Professional

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

Signature: _____ Date: _____

Licensed Professional

,
(____)____-_____



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

Professional Engineer Stamp
(if applicable)

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering

Rooftops

Rooftop Units

Tag	RTU-8	RTU-7
Unit Type	Package Rooftop	Package Rooftop
Qty	1	1
Location	Roof	Roof
Area Served	Lockers/Coach's Office	Corridors
Manufacturer	Trane	Trane
Model No.	GRCA25PDMF0L2CK102 A0CELP3	YCD180B3LAGA
Serial No.	L03C03835	306100286D
Cooling Type	No Cooling	Packaged DX
Cooling Capacity (Tons)	N/A	15
Cooling Efficiency (SEER/EER)	N/A	9.7 EER
Heating Type	Gas Furnace	Gas Furnace
Heating Input (MBH)	250	350/250
Efficiency	79%	81.2%
Supply Fan (HP)	1	3
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Return/Exhaust Fan (HP)	N/A	N/A
Return/Exhaust Fan VFD	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12	12
ASHRAE Service Life	15	15
Remaining Life	3	3
Comments		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Rooftops

Rooftop Units

Tag	RTU-2	RTU-6
Unit Type	Energy Recovery Unit	Packaged Rooftop
Qty	1	1
Location	Roof	Roof
Area Served	Gym	Library
Manufacturer	Des Champs Technologies	Trane
Model No.	PV-MZP-8707	YCD150D3HAAA
Serial No.	45892	309100876D
Cooling Type	No Cooling	Packaged DX
Cooling Capacity (Tons)	N/A	12.5
Cooling Efficiency (SEER/EER)	N/A	9.6 EER
Heating Type	Gas Furnace	Gas Furnace
Heating Input (MBH)	280	250/150
Efficiency	81%	81.2%
Supply Fan (HP)	7.5	3
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Return/Exhaust Fan (HP)	7.5	N/A
Return/Exhaust Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12	12
ASHRAE Service Life	15	15
Remaining Life	3	3
Comments		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Rooftops

Rooftop Units

Tag	RTU-3, 11	RTU-5
Unit Type	Packaged Rooftop	Packaged Rooftop
Qty	2	1
Location	Roof	Roof
Area Served	APR/Stage	2nd Floor Music Room
Manufacturer	AAON	Trane
Model No.	RK-13-2-F0-31M...	YSC120A3RMA15...
Serial No.	200303-AK GK...	315100186L
Cooling Type	Packaged DX	Packaged DX
Cooling Capacity (Tons)	13	10
Cooling Efficiency (SEER/EER)	9.8 EER	10.2 EER
Heating Type	No Heating	Gas Furnace
Heating Input (MBH)	N/A	250/150
Efficiency	N/A	81%
Supply Fan (HP)	5	3
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Return/Exhaust Fan (HP)	1	N/A
Return/Exhaust Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12	12
ASHRAE Service Life	15	15
Remaining Life	3	3
Comments		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Rooftops

Rooftop Units

Tag	RTU-4	RTU-1
Unit Type	Packaged Rooftop	Packaged Rooftop
Qty	1	1
Location	Roof	Roof
Area Served	1st Floor Music Room	BOE Offices
Manufacturer	Trane	Trane
Model No.	YCD180B3LAGA	YCD180B3LCGA
Serial No.	306100254D	302100790D
Cooling Type	Packaged DX	Packaged DX
Cooling Capacity (Tons)	15	15
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER
Heating Type	Gas Furnace	Gas Furnace
Heating Input (MBH)	350/250	350/250
Efficiency	81%	81%
Supply Fan (HP)	3	5
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Return/Exhaust Fan (HP)	N/A	N/A
Return/Exhaust Fan VFD	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12	12
ASHRAE Service Life	15	15
Remaining Life	3	3
Comments		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Rooftops

Rooftop Units

Tag	RTU-9, 10
Unit Type	Packaged Rooftop
Qty	2
Location	Roof
Area Served	APR/Stage
Manufacturer	Trane
Model No.	YSC120A3RMA...
Serial No.	315100261L
Cooling Type	Packaged DX
Cooling Capacity (Tons)	10
Cooling Efficiency (SEER/EER)	10.2 EER
Heating Type	Gas Furnace
Heating Input (MBH)	250/150
Efficiency	81%
Supply Fan (HP)	5
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Return/Exhaust Fan (HP)	N/A
Return/Exhaust Fan VFD	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12
ASHRAE Service Life	15
Remaining Life	3
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Air Handler Units

Tag	AHU-1
Unit Type	Central AHU
Qty	1
Location	Industrial Arts Shop
Area Served	Industrial Arts Shop
Manufacturer	Trane
Model No.	MCCB008N0A000...
Serial No.	K03C35115
Cooling Type	Chilled Water
Cooling Capacity (Tons)	171 MBH
Heating Type	Hot Water
Heating Input (MBH)	235.2 MBH
Supply Fan (HP)	3
Supply Fan VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Return Fan (HP)	N/A
Return Fan VFD	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
Approx Age	12
ASHRAE Service Life	20
Remaining Life	8
Comments	

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Terminal Units

Terminal Units

Tag	UV	UV
Unit Type	Vertical Unit Ventilator	Horizontal Unit Ventilator
Qty	25	4
Location	Classrooms	Classrooms
Area Served	Classrooms	Classrooms
Manufacturer	Trane	Trane
Model No.	VUV-B	HUV-B
Serial No.	W03D12325	"_"
Cooling Type	Chilled Water	Chilled Water
Cooling Capacity (MBH)	39.3 to 61.5	16.2 to 66.7
Cooling Efficiency	1.22 kW/Ton (Chiller)	1.22 kW/Ton (Chiller)
Heating Type	Hot Water	Hot Water
Heating Input (MBH)	41.3 to 70.2	16.2 to 79.4
Heating Efficiency	92%	92%
Approx Age	12	12
ASHRAE Service Life	20	20
Remaining Life	8	8
Comments		

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Terminal Units

Terminal Units

Tag	EUV	FCU-1
Unit Type	Wall Exhauster	Fan Coil
Qty	19	1
Location	Classrooms	Office
Area Served	Classrooms	Office
Manufacturer	Trane	Trane
Model No.	EUV	FCB-040
Serial No.	"_"	"_"
Cooling Type	N/A	Chilled Water
Cooling Capacity (MBH)	N/A	13
Cooling Efficiency	N/A	1.22 kW/Ton (Chiller)
Heating Type	N/A	Hot Water
Heating Input (MBH)	N/A	14.1
Heating Efficiency	N/A	92%
Approx Age	12	12
ASHRAE Service Life	20	20
Remaining Life	8	8
Comments	Up to 750 CFM	

Note:

"N/A" = Not Applicable.

"_" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Terminal Units

Terminal Units

Tag	CUH	HWC
Unit Type	Unit Heater	Hot Water Convectector
Qty	8	4
Location	Corridors, Stairs & Vestibules	Restroom Perimeter Walls
Area Served	Corridors, Stairs & Vestibules	Restrooms
Manufacturer	Brasch	"_"
Model No.	C304L & C404L	"_"
Serial No.	"_"	"_"
Cooling Type	N/A	N/A
Cooling Capacity (MBH)	N/A	N/A
Cooling Efficiency	N/A	N/A
Heating Type	Electric	Hot Water
Heating Input (MBH)	2.0 to 5.0 kW	8.5 BTUH
Heating Efficiency	97%	92%
Approx Age	12	12
ASHRAE Service Life	20	20
Remaining Life	8	8
Comments		

Note:

"N/A" = Not Applicable.

"_" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Boilers

Boilers

Tag	B-1
Unit Type	Fire-Tube (Water)
Qty	1
Location	Boiler Room
Manufacturer	AERCO
Model No.	BMK-2.0 GWB
Serial No.	G-03-0257
Input Capacity (MBH)	2,000
Output Capacity (MBH)	1,840
Approx. Efficiency %	92%
Fuel Type	Natural Gas
Approx Age	12
ASHRAE Service Life	25
Remaining Life	13
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Boilers

Boilers

Tag	B-2
Unit Type	Fire-Tube (Water)
Qty	1
Location	Boiler Room
Manufacturer	AERCO
Model No.	BMK-2.0 GWB
Serial No.	G-03-0256
Input Capacity (MBH)	2,000
Output Capacity (MBH)	1,840
Approx. Efficiency %	92%
Fuel Type	Natural Gas
Approx Age	12
ASHRAE Service Life	25
Remaining Life	13
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Boilers

Boilers

Tag	B-3
Unit Type	Fire-Tube (Water)
Qty	1
Location	Boiler Room
Manufacturer	AERCO
Model No.	BMK-2.0 GWB
Serial No.	G-03-0255
Input Capacity (MBH)	2,000
Output Capacity (MBH)	1,840
Approx. Efficiency %	92%
Fuel Type	Natural Gas
Approx Age	12
ASHRAE Service Life	25
Remaining Life	13
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Chiller

Chiller

Tag	ACCH-1
Unit Type	Air-Cooled
Qty	1
Location	Roof
Area Served	Classrooms
Manufacturer	Trane
Model No.	RTAC 200A UFCH...
Serial No.	U03F09941
Refrigerant	R-134a
Cooling Capacity (Tons)	200
Cooling Efficiency (KW/Ton)	1.22 kW/Ton
Volts / Phase / Hz	208/3/60
Chilled Water GPM / ΔT	487.5/10°F
Condenser Water GPM / ΔT	N/A - Air Cooled
Approx Age	12
ASHRAE Service Life	20
Remaining Life	8
Comments	25-30% Glycol Solution

Note:

"N/A" = Not Applicable.

"-

" = Info Not Available

MAJOR EQUIPMENT LIST

Dom HWH

Concord Engineering

Domestic Water Heaters

Tag	DHW-1
Unit Type	Gas-Fired Water Heater
Qty	1
Location	Buildings & Grounds Office
Area Served	Entire Facility
Manufacturer	Bradford White
Model #	DM80T1993N
Serial #	BG6389325
Storage Size (Gal)	80
Input Capacity	199,999 BTUH
Recovery (Gal/Hr)	193.9
Efficiency %	80%
Fuel	Natural Gas
Approx Age	10
ASHRAE Service Life	15
Remaining Life	5
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Pumps

Pumps

Tag	HWP-1	HWP-2
Unit Type	Base-mounted	Base-mounted
Qty	1	1
Location	Boiler Room	Boiler Room
System Served	Heating Hot Water	Heating Hot Water
Manufacturer	Bell & Gossett	Bell & Gossett
Model #	1510BF	1510BF
Serial #	CP2040-02 A30	CP2040-02 A30
Horse Power	10.0	10.0
Flow Rate (GPM)	430	430
Head Pressure (FTHD)	60	60
Motor Manufacturer	Marathon Electric	Marathon Electric
Motor Frame		
Electrical Power (V/P/HZ)	208/3/60	208/3/60
Motor RPM	1760	1760
Motor Efficiency %	89.5%	89.5%
Pump VFD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Approx Age	12	12
ASHRAE Service Life	18	18
Remaining Life	6	6
Comments		

Note:

"N/A" = Not Applicable.

MAJOR EQUIPMENT LIST

Concord Engineering

Pumps

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Pumps

Pumps

Tag	CHWP-1
Unit Type	Base-mounted
Qty	1
Location	Boiler Room
System Served	Primary Chilled Water
Manufacturer	Bell & Gossett
Model #	1510BF
Serial #	CP2040-02 A30
Horse Power	10.0
Flow Rate (GPM)	430
Head Pressure (FTHD)	60
Motor Manufacturer	Marathon Electric
Motor Frame	
Electrical Power (V/P/HZ)	208/3/60
Motor RPM	1760
Motor Efficiency %	89.5%
Pump VFD	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Approx Age	12
ASHRAE Service Life	18
Remaining Life	6
Comments	

Note:

"N/A" = Not Applicable.

MAJOR EQUIPMENT LIST

Concord Engineering

Pumps

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Condensing Units

Concord Engineering

Condensing Units

Tag	AC-4	AC-1	AC-2
Unit Type	Standard Air-Cooled	Mini-Split	Mini-Split
Qty	1	1	1
Location	Roof	Roof	Roof
Area/Unit Served	MDF	BOE Conf. Room	Superintendent's Office
Manufacturer	Fujitsu	EMI	EMI
Model No.	AOU36RLXFZ	No Tag	No Tag
Serial No.	LVN021912	No Tag	No Tag
Refrigerant Type	R-410a	R-22	R-22
Cooling Capacity	35.2 MBH	1.5 Tons	1.5 Tons
Cooling Efficiency	16 SEER	12 SEER	12 SEER
Volts / Phase / Hz	208/3/60	208/3/60	208/3/60
Approx Age	12	12	12
ASHRAE Service Life	20	20	20
Remaining Life	8	8	8
Comments	Indoor Unit M/N: AOU36RLXFZ	With Energy Recovery Section	With Energy Recovery Section

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Exhaust Fans

Tag	EF-1	EF-12, 13
Unit Type	Up Blast	Wall-Mounted
Qty	1	2
Location	Roof	Stage
Area Served	Toilet Exhaust	Stage
Manufacturer	Cook	Cook
Model #	ACE-B-150	P-18T
Motor (HP)	1/2	1/4
Electrical (V/H/P)	115/60/1	115/60/1
Approx Age	12	12
ASHRAE Service Life	20	20
Remaining Life	8	8
Comments	2,100 CFM	1,450 CFM

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Exhaust Fans

Tag	EF-14
Unit Type	Up Blast
Qty	1
Location	Roof
Area Served	2nd Floor Corridors
Manufacturer	Cook
Model #	ACE-B-100
Motor (HP)	1/4
Electrical (V/H/P)	115/60/1
Approx Age	12
ASHRAE Service Life	20
Remaining Life	8
Comments	800 CFM

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Kitchen-Misc

Concord Engineering

Kitchen / Misc.

Tag			
Unit Type	Reach-in Refrigerator	Convection Oven	Reach-in Freezer
Qty	1	1	1
Location	Kitchen	Kitchen	Kitchen
Manufacturer	The Delfield Co.	Garland	True Manufacturing Company
Model No.	MRR1-SH		T-23F
Serial No.	BCY...		7824876
Fuel	Electric	Natural Gas	Electric
Comments			

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Kitchen-Misc

Concord Engineering

Kitchen / Misc.

Tag			
Unit Type	Refrigerator	Residential Refrigerator	Residential Refrigerator
Qty	3	1	1
Location	Kitchen	Kitchen	Faculty Room
Manufacturer	Beverage Air	Electrolux Home Products	Maytag
Model No.		FRU17B2JW15	M1TXEMMWB03
Serial No.		WA83500510	VS10784947
Fuel		Electric	Electric
Comments			

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Kitchen-Misc

Concord Engineering

Kitchen / Misc.

Tag	
Unit Type	Residential Refrigerator
Qty	1
Location	
Manufacturer	Summit
Model No.	FF1062
Serial No.	RZ900699
Fuel	Electric
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: IC15683
 Facility Name: Valley View School
 Address: 50 Valley View Road
 City, State, Zip: Watchung, NJ 07069

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT					RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS				LIGHTING RETROFIT COSTS				LIGHTING CONTROLS COST										
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
1	CR 102	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	12	1.03	2,683	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,326	\$229	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.67	\$200.00	\$50.00	\$250.00	\$35.00	4.58
2	1st Flr West Corridor	3000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	17	1.05	3,162	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	17	0.49	1,479	0.56	1,683	\$291	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	296	\$51	\$1,020.00	\$807.50	\$1,827.50	\$170.00	5.69	\$600.00	\$100.00	\$700.00	FALSE	13.68
1	Office 101D	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	6	0.52	2,064	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	6	0.26	1,044	0.26	1,020	\$176	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	209	\$36	\$540.00	\$285.00	\$825.00	\$60.00	4.34	\$50.00	\$50.00	\$100.00	\$20.00	2.21
1	CR 104	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	12	1.03	2,683	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,326	\$229	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.67	\$200.00	\$50.00	\$250.00	FALSE	5.32
1	CR 106	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	12	1.03	2,683	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,326	\$229	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.67	\$200.00	\$50.00	\$250.00	\$35.00	4.58
1	BoE Office 101A	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	19	1.63	6,536	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	19	0.83	3,306	0.81	3,230	\$559	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	661	\$114	\$1,710.00	\$902.50	\$2,612.50	\$190.00	4.34	\$50.00	\$50.00	\$100.00	FALSE	0.87
1	BoE Office 101C	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	4	0.34	1,376	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	696	0.17	680	\$118	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	139	\$24	\$360.00	\$190.00	\$550.00	\$40.00	4.34	\$50.00	\$50.00	\$100.00	FALSE	4.15
1	Copy Room/Kitchen 101E	600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	4	0.34	206	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	104	0.17	102	\$18	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	21	\$4	\$360.00	\$190.00	\$550.00	\$40.00	28.90	\$50.00	\$50.00	\$100.00	\$20.00	22.15
1	Conference Room 101F	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	4	0.34	1,376	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	696	0.17	680	\$118	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	139	\$24	\$360.00	\$190.00	\$550.00	\$40.00	4.34	\$200.00	\$50.00	\$250.00	FALSE	10.38
3	Office 101 Restroom	1200	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86	1	0.09	103	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	35	0.06	68	\$12	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	7	\$1	\$90.00	\$47.50	\$137.50	\$10.00	10.77	\$50.00	\$50.00	\$100.00	FALSE	83.05
4	Boiler Room Entrance	400	1-Lamp T8 32W 6"x4" Pendant-mounted Open Strip Light	1	33	1	0.03	13	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	1	14.5	1	0.01	6	0.02	7	\$1	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$47.50	\$77.50	\$5.00	56.63	\$0.00	\$0.00	\$0.00	FALSE	-
5	Boiler Room	400	175W Low-bay MH	1	210	2	0.42	168	Re-Lamp	Light Efficient Design 100W LED (LED-8036M Low-Bay	1	100	2	0.20	80	0.22	88	\$15	0	No New Controls	0	0.0%	0	\$0	\$140.00	\$95.00	\$235.00	\$20.00	14.12	\$0.00	\$0.00	\$0.00	FALSE	-
6	Boiler Room	400	6"x6" Ceiling-mounted prismatic 70 Watt HPS lamp	1	91	3	0.27	109	Replace	RAB Ceiling Mounted LED sVANLED10NF	1	10	3	0.03	12	0.24	97	\$17	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$142.50	\$682.50	\$30.00	38.80	\$0.00	\$0.00	\$0.00	FALSE	-
7	Boiler Room	400	2-Lamp T8 32W 6"x4" Pendant-mounted Open Industrial Shade	2	62	1	0.06	25	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	1	0.03	12	0.03	13	\$2	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$47.50	\$107.50	\$10.00	42.70	\$0.00	\$0.00	\$0.00	FALSE	-
1	Principal's Office 107B	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	4	0.34	138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	70	0.17	68	\$12	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	14	\$2	\$360.00	\$190.00	\$550.00	\$40.00	43.15	\$200.00	\$50.00	\$250.00	FALSE	103.81
1	Office 107	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	4	0.34	138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	70	0.17	68	\$12	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	14	\$2	\$360.00	\$190.00	\$550.00	\$40.00	43.15	\$200.00	\$50.00	\$250.00	FALSE	103.81
8	Boy's RR	2600	2-Lamp T8 32W 1x4 Pendant-mounted Wrap Prismatic Lens	2	62	2	0.12	322	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	2	0.06	151	0.07	172	\$30	0	No New Controls	1	0.0%	0	\$0	\$120.00	\$95.00	\$215.00	\$20.00	6.57	\$0.00	\$50.00	\$50.00	FALSE	-
1	Conference Room 112	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	2	0.17	690	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	348	0.09	342	\$59	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	70	\$12	\$180.00	\$95.00	\$275.00	\$20.00	4.31	\$200.00	\$50.00	\$250.00	FALSE	20.76
9	Maintenance Office 108	4000	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	9	0.56	2,232	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	9	0.26	1,044	0.30	1,188	\$206	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	209	\$36	\$540.00	\$427.50	\$967.50	\$90.00	4.27	\$200.00	\$50.00	\$250.00	\$35.00	5.95
1	Maintenance Office 108	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	2	0.17	690	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	348	0.09	342	\$59	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	70	\$12	\$180.00	\$95.00	\$275.00	\$20.00	4.31	\$200.00	\$50.00	\$250.00	FALSE	20.76
9	Storage S116	400	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	4	0.25	99	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	4	0.12	46	0.13	53	\$9	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	9	\$2	\$240.00	\$190.00	\$430.00	\$40.00	42.70	\$50.00	\$50.00	\$100.00	FALSE	62.29
1	Small Group Room 122	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	6	0.52	2,069	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	6	0.26	1,044	0.26	1,025	\$177	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	209	\$36	\$540.00	\$285.00	\$825.00	\$60.00	4.31	\$200.00	\$50.00	\$250.00	FALSE	6.92
10	Storage S124	400	A-Lamp 18W CFL	1	18	2	0.04	14	Re-Lamp	12 Watt A-Lamp LED	1	12	2	0.02	10	0.01	5	\$1	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	2	\$0	\$60.00	\$95.00	\$155.00	\$20.00	162.57	\$50.00	\$50.00	\$100.00	FALSE	301.06
1	Small Group Room 126B	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	6	0.52	2,069	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	6	0.26	1,044	0.26	1,025	\$177	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	209	\$36	\$540.00	\$285.00	\$825.00	\$60.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	5.95
2	1st Flr North Corridor	3000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	17	1.05	3,162	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	17	0.49	1,479	0.56	1,683	\$291	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	296	\$51	\$1,020.00	\$807.50	\$1,827.50	\$170.00	5.69	\$900.00	\$150.00	\$1,050.00	FALSE	20.52

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
1	Small Group Room 126A	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86	6	0.52	2,069	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	6	0.26	1,044	0.26	1,025	\$177	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	209	\$36	\$540.00	\$285.00	\$825.00	\$60.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	5.95
8	Girl's RR	2600	2-Lamp T8 32W 1x4 Pendant-mounted Wrap Prismatic Lens	2	62	2	0.12	322	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	2	0.06	151	0.07	172	\$30	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$95.00	\$215.00	\$20.00	6.57	\$0.00	\$0.00	\$0.00	FALSE	-
1	Nurse's Room 129	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	12	1.03	4,138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	2,088	0.51	2,050	\$355	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	418	\$72	\$1,080.00	\$570.00	\$1,650.00	\$120.00	4.31	\$200.00	\$50.00	\$250.00	FALSE	3.46
11	Nurse's Room 129	4000	3-Lamp 31W 2x2 Recessed Parabolic U-Tubes	3	90.1	2	0.18	721	New Fixture	New Phillips 2x2 LED Fixture 2-Lamps	2	29	2	0.06	232	0.12	489	\$85	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	46	\$8	\$290.00	\$180.00	\$470.00	\$100.00	4.38	\$200.00	\$50.00	\$250.00	\$35.00	26.78
1	Rest Room 129A	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	690	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	348	0.09	342	\$59	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$95.00	\$275.00	\$20.00	4.31	\$0.00	\$0.00	\$0.00	FALSE	-
1	RR 129B	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	1	0.09	224	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	1	0.04	113	0.04	111	\$19	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$47.50	\$137.50	\$10.00	6.64	\$0.00	\$0.00	\$0.00	FALSE	-
1	Nurse's Storage 129C	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	1	0.09	34	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	1	0.04	17	0.04	17	\$3	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	3	\$1	\$90.00	\$47.50	\$137.50	\$10.00	43.15	\$50.00	\$50.00	\$100.00	FALSE	166.10
1	Art Room 131	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	17	1.47	3,810	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	17	0.74	1,923	0.73	1,887	\$327	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	385	\$67	\$1,530.00	\$807.50	\$2,337.50	\$170.00	6.64	\$400.00	\$100.00	\$500.00	FALSE	7.52
9	Storage S151	400	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	9	0.56	223	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	9	0.26	104	0.30	119	\$21	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	21	\$4	\$540.00	\$427.50	\$967.50	\$90.00	42.70	\$50.00	\$50.00	\$100.00	FALSE	27.68
1	Art Storage 131A	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	70	0.17	68	\$12	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	14	\$2	\$360.00	\$190.00	\$550.00	\$40.00	43.15	\$50.00	\$50.00	\$100.00	FALSE	41.53
1	Kiln Room	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	69	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	35	0.09	34	\$6	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	7	\$1	\$180.00	\$95.00	\$275.00	\$20.00	43.15	\$50.00	\$50.00	\$100.00	FALSE	83.05
12	Boy's RR	2600	4-Lamp T8 32W 2x4 Recessed Prismatic Lens	4	106.7	2	0.21	555	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	14.5	2	0.03	75	0.18	479	\$83	0	No New Controls	0	0.0%	0	\$0	\$240.00	\$95.00	\$335.00	\$80.00	3.07	\$0.00	\$0.00	\$0.00	FALSE	-
13	Electrical/Storage	400	2-Lamp T8 32W 1x4 Ceiling-mounted Wrap Prismatic Lens	2	62	4	0.25	99	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	4	0.12	46	0.13	53	\$9	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	9	\$2	\$240.00	\$190.00	\$430.00	\$40.00	42.70	\$50.00	\$50.00	\$100.00	FALSE	62.29
14	Electrical/Storage	400	A-Lamp 75W Flood Lamp	1	75	1	0.08	30	Re-Lamp	Philips 19 Watt PAR 38 LED Flood	1	19	1	0.02	8	0.06	22	\$4	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	2	\$0	\$30.00	\$47.50	\$77.50	\$10.00	17.42	\$50.00	\$50.00	\$100.00	FALSE	380.29
9	Storage S133	400	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	4	0.25	99	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	4	0.12	46	0.13	53	\$9	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	9	\$2	\$240.00	\$190.00	\$430.00	\$40.00	42.70	\$50.00	\$50.00	\$100.00	FALSE	62.29
38	Multi-Purpose Room 135	2600	3-Lamp T8 32W 2x4 Pendant-mounted Direct/Indirect Lens	3	86.2	72	6.21	16,137	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	72	3.13	8,143	3.07	7,993	\$1,383		No New Controls	0	0.0%	0	\$0	\$4,320.00	\$3,420.00	\$7,740.00	\$720.00	5.08	\$0.00	\$0.00	\$0.00	FALSE	-
37	Multi-Purpose Room 135	2600	3-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	3	86.2	19	1.64	4,258	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	19	0.83	2,149	0.81	2,109	\$365		No New Controls	0	0.0%	0	\$0	\$1,710.00	\$902.50	\$2,612.50	\$190.00	6.64	\$0.00	\$0.00	\$0.00	FALSE	-
9	MPR Stage 141	2600	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	12	0.74	1,934	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	12	0.35	905	0.40	1,030	\$178		No New Controls	0	0.0%	0	\$0	\$720.00	\$570.00	\$1,290.00	\$120.00	6.57	\$0.00	\$0.00	\$0.00	FALSE	-
1	MPR-to-Stage West Stairwell	3000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	261	0.09	256	\$44	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	52	\$9	\$180.00	\$95.00	\$275.00	\$20.00	5.75	\$200.00	\$50.00	\$250.00	FALSE	27.68
1	MPR-to-Stage East Stairwell	3000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	261	0.09	256	\$44	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	52	\$9	\$180.00	\$95.00	\$275.00	\$20.00	5.75	\$200.00	\$50.00	\$250.00	FALSE	27.68
3	MPR Kitchen 137	600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	11	0.95	569	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	11	0.32	191	0.63	378	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	38	\$7	\$990.00	\$522.50	\$1,512.50	\$110.00	21.47	\$200.00	\$50.00	\$250.00	FALSE	37.75
1	CR 144	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	16	1.38	3,586	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	16	0.70	1,810	0.68	1,776	\$307	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	362	\$63	\$1,440.00	\$760.00	\$2,200.00	\$160.00	6.64	\$200.00	\$50.00	\$250.00	FALSE	3.99
13	Lab Storage 146	400	2-Lamp T8 32W 1x4 Ceiling-mounted Wrap Prismatic Lens	2	62	6	0.37	149	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	6	0.17	70	0.20	79	\$14	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	14	\$2	\$360.00	\$285.00	\$645.00	\$60.00	42.70	\$50.00	\$50.00	\$100.00	\$20.00	33.22
1	Lab 148	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	20	1.72	4,482	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	20	0.87	2,262	0.85	2,220	\$384	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	452	\$78	\$1,800.00	\$950.00	\$2,750.00	\$200.00	6.64	\$400.00	\$100.00	\$500.00	FALSE	6.39
1	Instrumental Music 147	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	18	1.55	4,034	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	18	0.78	2,036	0.77	1,998	\$346	5	Dual Technology Occupancy Sensor - Remote Mnt.	3	20.0%	407	\$70	\$1,620.00	\$855.00	\$2,475.00	\$180.00	6.64	\$600.00	\$150.00	\$750.00	FALSE	10.65
1	Instrumental Storage 149	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	9	0.78	310	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	9	0.39	157	0.38	154	\$27	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	31	\$5	\$810.00	\$427.50	\$1,237.50	\$90.00	43.15	\$50.00	\$50.00	\$100.00	FALSE	18.46
2	1st Flr East Corridor	3000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	16	0.99	2,976	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	16	0.46	1,392	0.53	1,584	\$274	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	278	\$48	\$960.00	\$760.00	\$1,720.00	\$160.00	5.69	\$900.00	\$150.00	\$1,050.00	FALSE	21.80

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS				LIGHTING RETROFIT COSTS				LIGHTING CONTROLS COST							
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kWh	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
17	NE Stairwell	3000	2-Lamp T8 32W 2x4 Recessed Prismatic Lens	2	62	3	0.19	558	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	3	0.09	261	0.10	297	\$51	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	52	\$9	\$180.00	\$142.50	\$322.50	\$30.00	5.69	\$600.00	\$100.00	\$700.00	FALSE	77.51
3	Girl's Locker Room 127	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	8	0.69	1,793	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	8	0.23	603	0.46	1,190	\$206	0	No New Controls	0	0.0%	0	\$0	\$720.00	\$380.00	\$1,100.00	\$80.00	4.96	\$0.00	\$0.00	\$0.00	FALSE	-
9	Girl's Locker Room 127	2600	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	6	0.37	967	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	6	0.17	452	0.20	515	\$89	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$285.00	\$645.00	\$60.00	6.57	\$0.00	\$0.00	\$0.00	FALSE	-
3	1st Flr NE Corridor	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	12	1.03	3,103	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	12	0.35	1,044	0.69	2,059	\$356	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	209	\$36	\$1,080.00	\$570.00	\$1,650.00	\$120.00	4.29	\$900.00	\$150.00	\$1,050.00	FALSE	29.07
1	Girl's Locker Room Storage 127 B	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	69	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	35	0.09	34	\$6	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$95.00	\$275.00	\$20.00	43.15	\$0.00	\$0.00	\$0.00	FALSE	-
1	CR 132	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,332	\$230	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.64	\$200.00	\$50.00	\$250.00	FALSE	5.32
1	CR 134	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,332	\$230	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.64	\$200.00	\$50.00	\$250.00	FALSE	5.32
1	CR 136	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	12	0.52	1,357	0.51	1,332	\$230	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$570.00	\$1,650.00	\$120.00	6.64	\$200.00	\$50.00	\$250.00	FALSE	5.32
9	Boy's Locker Room 125	2600	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	6	0.37	967	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	6	0.17	452	0.20	515	\$89	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$285.00	\$645.00	\$60.00	6.57	\$0.00	\$0.00	\$0.00	FALSE	-
3	Boy's Locker Room 125	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	8	0.69	1,793	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	8	0.23	603	0.46	1,190	\$206	0	No New Controls	0	0.0%	0	\$0	\$720.00	\$380.00	\$1,100.00	\$80.00	4.96	\$0.00	\$0.00	\$0.00	FALSE	-
1	Locker Room Office 125B	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	1,379	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	696	0.17	683	\$118	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$190.00	\$550.00	\$40.00	4.31	\$0.00	\$0.00	\$0.00	FALSE	-
3	Vestibule (Exit #6)	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	1	0.09	259	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	87	0.06	172	\$30	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$47.50	\$137.50	\$10.00	4.29	\$0.00	\$0.00	\$0.00	FALSE	-
3	Women's RR 123T	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	6	0.52	1,345	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	6	0.17	452	0.34	892	\$154	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	90	\$16	\$540.00	\$285.00	\$825.00	\$60.00	4.96	\$50.00	\$50.00	\$100.00	\$20.00	5.11
3	Men's RR 121T	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	6	0.52	1,345	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	6	0.17	452	0.34	892	\$154	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	90	\$16	\$540.00	\$285.00	\$825.00	\$60.00	4.96	\$50.00	\$50.00	\$100.00	FALSE	6.39
15	Gymnasium 117	3000	6-Lamp T5 54W 2x4 Pendant	6	361	24	8.66	25,992	Existing to Remain	No Change	6	361	0	8.66	25,992	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$0.00	\$0.00	\$0.00	FALSE	-
9	Gym Storage 119	400	2-Lamp T8 32W 1x4 Pendant-mounted Open Industrial Shade	2	62	6	0.37	149	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	6	0.17	70	0.20	79	\$14	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	14	\$2	\$360.00	\$285.00	\$645.00	\$60.00	42.70	\$50.00	\$50.00	\$100.00	\$20.00	33.22
3	Gym Exit Vestibule (Exit #3)	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	2	0.06	174	0.11	343	\$59	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$95.00	\$275.00	\$20.00	4.29	\$0.00	\$0.00	\$0.00	FALSE	-
3	Gym Exit Vestibule (Exit #4)	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	2	0.06	174	0.11	343	\$59	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$95.00	\$275.00	\$20.00	4.29	\$0.00	\$0.00	\$0.00	FALSE	-
19	Computer Room 113	2600	2-Lamp T8 32W Pendant-mounted Direct/Indirect Lens	2	62	12	0.74	1,934	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	12	0.35	905	0.40	1,030	\$178	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$31	\$720.00	\$570.00	\$1,290.00	\$120.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	6.87
20	Industrial Arts	2600	2-Lamp T8 32W 6"x4" Pendant-mounted Vapor-Tight Prismatic Lens	2	62	23	1.43	3,708	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	23	0.67	1,734	0.76	1,973	\$341	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	347	\$60	\$1,840.00	\$1,092.50	\$2,932.50	\$230.00	7.92	\$400.00	\$100.00	\$500.00	\$35.00	7.75
3	Industrial Arts Entrance	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	2	0.06	174	0.11	343	\$59	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	35	\$6	\$180.00	\$95.00	\$275.00	\$20.00	4.29	\$200.00	\$50.00	\$250.00	FALSE	41.53
3	Main Corridor	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	44	3.79	11,378	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	44	1.28	3,828	2.52	7,550	\$1,306	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	4	20.0%	766	\$132	\$3,960.00	\$2,090.00	\$6,050.00	\$440.00	4.29	\$1,200.00	\$200.00	\$1,400.00	FALSE	10.57
16	Main Lobby	3000	A-Lamp 18W CFL, Recessed Hi-Hat in Perimeter Soffit	1	18	9	0.16	486	Re-Lamp	12 Watt A-Lamp LED	1	12	9	0.11	324	0.05	162	\$28	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$427.50	\$697.50	\$90.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
3	NW Stairwell	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	2	0.06	174	0.11	343	\$59	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	35	\$6	\$180.00	\$95.00	\$275.00	\$20.00	4.29	\$600.00	\$100.00	\$700.00	FALSE	116.27
21	NW Stairwell	3000	2-Lamp T8 32W 2x2 Recessed Prismatic U-Tube	2	62	1	0.06	186	New Fixture	New Phillips 2x2 LED Fixture 2-Lamps	2	29	1	0.03	87	0.03	99	\$17	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	17	\$3	\$145.00	\$90.00	\$235.00	\$50.00	10.80	\$600.00	\$100.00	\$700.00	FALSE	232.54

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS				LIGHTING RETROFIT COSTS				LIGHTING CONTROLS COST								
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
3	Corridor	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	3	0.26	776	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	3	0.09	261	0.17	515	\$89	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	52	\$9	\$270.00	\$142.50	\$412.50	\$30.00	4.29	\$900.00	\$150.00	\$1,050.00	FALSE	116.27
2	SW Stairwell	3000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	1	0.06	186	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	1	0.03	87	0.03	99	\$17	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	17	\$3	\$60.00	\$47.50	\$107.50	\$10.00	5.69	\$600.00	\$100.00	\$700.00	FALSE	232.54
3	SW Stairwell	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	6	0.52	1,552	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	6	0.17	522	0.34	1,030	\$178	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	104	\$18	\$540.00	\$285.00	\$825.00	\$60.00	4.29	\$600.00	\$100.00	\$700.00	FALSE	38.76
2	CR 202	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	14	0.87	2,257	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	14	0.41	1,056	0.46	1,201	\$208	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	211	\$37	\$840.00	\$665.00	\$1,505.00	\$140.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	5.89
3	Restroom	1200	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	1	0.09	103	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	35	0.06	69	\$12	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$47.50	\$137.50	\$10.00	10.74	\$0.00	\$0.00	\$0.00	FALSE	-
1	CR 201	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	8	0.69	1,793	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	8	0.35	905	0.34	888	\$154	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$31	\$720.00	\$380.00	\$1,100.00	\$80.00	6.64	\$200.00	\$50.00	\$250.00	\$35.00	6.87
2	CR 204	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	21	1.30	3,385	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	21	0.61	1,583	0.69	1,802	\$312	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	317	\$55	\$1,260.00	\$997.50	\$2,257.50	\$210.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	3.92
2	CR 205	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	21	1.30	3,385	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	21	0.61	1,583	0.69	1,802	\$312	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	317	\$55	\$1,260.00	\$997.50	\$2,257.50	\$210.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	3.92
2	CR 206	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	21	1.30	3,385	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	21	0.61	1,583	0.69	1,802	\$312	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	317	\$55	\$1,260.00	\$997.50	\$2,257.50	\$210.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	3.92
2	CR 207	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	20	1.24	3,224	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	20	0.58	1,508	0.66	1,716	\$297	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	302	\$52	\$1,200.00	\$950.00	\$2,150.00	\$200.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	4.12
12	Girl's RR	2600	4-Lamp T8 32W 2x4 Recessed Prismatic Lens	4	106.7	4	0.43	1,110	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	14.5	4	0.06	151	0.37	959	\$166	0	No New Controls	0	0.0%	0	\$0	\$480.00	\$190.00	\$670.00	\$160.00	3.07	\$0.00	\$0.00	\$0.00	FALSE	-
12	Storage	400	4-Lamp T8 32W 2x4 Recessed Prismatic Lens	4	106.7	1	0.11	43	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	14.5	1	0.01	6	0.09	37	\$6	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	1	\$0	\$120.00	\$47.50	\$167.50	\$40.00	19.98	\$50.00	\$50.00	\$100.00	FALSE	498.31
22	Roof Access	400	4-Lamp T8 32W 2x4 Pendant-mounted Prismatic Wrap	4	106.7	1	0.11	43	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	58	1	0.06	23	0.05	19	\$3	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$47.50	\$167.50	\$40.00	37.83	\$0.00	\$0.00	\$0.00	FALSE	-
2	CR 209	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	18	1.12	2,902	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	18	0.52	1,357	0.59	1,544	\$267	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	271	\$47	\$1,080.00	\$855.00	\$1,935.00	\$180.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	4.58
2	CR 211	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	21	1.30	3,385	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	21	0.61	1,583	0.69	1,802	\$312	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	317	\$55	\$1,260.00	\$997.50	\$2,257.50	\$210.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	3.92
23	2nd Flr West Corridor	2600	2-Lamp T8 32W Recessed Prismatic Lens	2	62	17	1.05	2,740	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	17	0.49	1,282	0.56	1,459	\$252	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	256	\$44	\$1,020.00	\$807.50	\$1,827.50	\$170.00	6.57	\$600.00	\$100.00	\$700.00	FALSE	15.78
21	2nd Flr West Corridor	3000	2-Lamp T8 32W 2x2 Recessed Prismatic U-Tube	2	62	1	0.06	186	New Fixture	New Phillips 2x2 LED Fixture 2-Lamps	2	29	1	0.03	87	0.03	99	\$17	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	17	\$3	\$145.00	\$90.00	\$235.00	\$50.00	10.80	\$300.00	\$50.00	\$350.00	FALSE	116.27
12	Boy's RR	2600	4-Lamp T8 32W 2x4 Recessed Prismatic Lens	4	106.7	4	0.43	1,110	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	14.5	4	0.06	151	0.37	959	\$166	0	No New Controls	0	0.0%	0	\$0	\$480.00	\$190.00	\$670.00	\$160.00	3.07	\$0.00	\$0.00	\$0.00	FALSE	-
1	Faculty Rm 214	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	11	0.95	2,465	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	11	0.48	1,244	0.47	1,221	\$211	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	249	\$43	\$990.00	\$522.50	\$1,512.50	\$110.00	6.64	\$50.00	\$50.00	\$100.00	\$20.00	1.86
16	Faculty Rm 214	2600	A-Lamp 18W CFL, Recessed Hi-Hat in Perimeter Soffit	1	18	4	0.07	187	Re-Lamp	12 Watt A-Lamp LED	1	12	4	0.05	125	0.02	62	\$11	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	25	\$4	\$120.00	\$190.00	\$310.00	\$40.00	25.01	\$200.00	\$50.00	\$250.00	FALSE	57.90
3	Faculty Storage	400	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	1	0.09	34	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	12	0.06	23	\$4	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	2	\$0	\$90.00	\$47.50	\$137.50	\$10.00	32.21	\$50.00	\$50.00	\$100.00	FALSE	249.15
1	MDF Tech Room 216	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	70	0.17	68	\$12	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	14	\$2	\$360.00	\$190.00	\$550.00	\$40.00	43.15	\$200.00	\$50.00	\$250.00	\$35.00	89.28
3	MDF Tech Server Room	400	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	1	0.09	34	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	12	0.06	23	\$4	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	2	\$0	\$90.00	\$47.50	\$137.50	\$10.00	32.21	\$200.00	\$50.00	\$250.00	FALSE	622.88
24	MDF Tech RR	1200	1-Lamp T8 32W 6"x18" Ceiling-mounted Prismatic Valence Fixture	1	33.2	1	0.03	40	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	1	14.5	1	0.01	17	0.02	22	\$4	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	3	\$1	\$30.00	\$47.50	\$77.50	\$5.00	18.68	\$200.00	\$50.00	\$250.00	FALSE	415.25
1	Tech Office 220	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	1,379	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	696	0.17	683	\$118	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	139	\$24	\$360.00	\$190.00	\$550.00	\$40.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	8.93

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS					LIGHTING RETROFIT COSTS				LIGHTING CONTROLS COST						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kWh	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
1	"SOAR" Room 222	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	5	0.43	1,121	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	5	0.22	566	0.21	555	\$96	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	113	\$20	\$450.00	\$237.50	\$687.50	\$50.00	6.64	\$200.00	\$50.00	\$250.00	FALSE	12.78
24	222 Storage Closet	400	1-Lamp T8 32W 6"x18" Ceiling-mounted Prismatic Valence Fixture	1	33.2	1	0.03	13	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	1	14.5	1	0.01	6	0.02	7	\$1	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	1	\$0	\$30.00	\$47.50	\$77.50	\$5.00	56.03	\$50.00	\$50.00	\$100.00	FALSE	498.31
25	222 Storage Closet	400	75W Incandescent "A" bulb	1	75	1	0.08	30	Re-Lamp	Philips 15 Watt LED A21	1	15	1	0.02	6	0.06	24	\$4	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	1	\$0	\$25.00	\$47.50	\$72.50	\$10.00	15.05	\$50.00	\$50.00	\$100.00	FALSE	481.70
3	Faculty RR	1200	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	1	0.09	103	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	1	0.03	35	0.06	69	\$12	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	7	\$1	\$90.00	\$47.50	\$137.50	\$10.00	10.74	\$50.00	\$50.00	\$100.00	FALSE	83.05
13	Computer Room 224	2600	2-Lamp T8 32W 1x4 Ceiling-mounted Wrap Prismatic Lens	2	62	21	1.30	3,385	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	21	0.61	1,583	0.69	1,802	\$312	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	317	\$55	\$1,260.00	\$997.50	\$2,257.50	\$210.00	6.57	\$200.00	\$50.00	\$250.00	\$35.00	3.92
1	Library/Media Center	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	28	2.41	6,275	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	28	1.22	3,167	1.20	3,109	\$538	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	633	\$110	\$2,520.00	\$1,330.00	\$3,850.00	\$280.00	6.64	\$400.00	\$100.00	\$500.00	FALSE	4.56
19	Library/Media Center	2600	2-Lamp T8 32W Pendant-mounted Direct/Indirect Lens	2	62	48	2.98	7,738	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	48	1.39	3,619	1.58	4,118	\$712	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	724	\$125	\$2,880.00	\$2,280.00	\$5,160.00	\$480.00	6.57	\$400.00	\$100.00	\$500.00	\$35.00	3.71
16	Library/Media Center	2600	A-Lamp 18W CFL, Recessed H-Hat in Perimeter Soffit	1	18	33	0.59	1,544	Re-Lamp	12 Watt A-Lamp LED	1	12	33	0.40	1,030	0.20	515	\$89	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	206	\$36	\$990.00	\$1,567.50	\$2,557.50	\$330.00	25.01	\$400.00	\$100.00	\$500.00	\$35.00	13.05
1	Office/Work Room 215	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	10	0.86	3,448	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	10	0.44	1,740	0.43	1,708	\$295	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	348	\$60	\$900.00	\$475.00	\$1,375.00	\$100.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	3.57
1	Office/Work Room 217	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	1,379	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	696	0.17	683	\$118	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	139	\$24	\$360.00	\$190.00	\$550.00	\$40.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	8.93
1	Work Room	4000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	3	0.26	1,034	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	3	0.13	522	0.13	512	\$89	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	104	\$18	\$270.00	\$142.50	\$412.50	\$30.00	4.31	\$200.00	\$50.00	\$250.00	\$35.00	11.90
23	2nd Flr North Corridor	3000	2-Lamp T8 32W Recessed Prismatic Lens	2	62	16	0.99	2,976	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	16	0.46	1,392	0.53	1,584	\$274	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	278	\$48	\$960.00	\$760.00	\$1,720.00	\$160.00	5.69	\$900.00	\$150.00	\$1,050.00	FALSE	21.80
12	Faculty RR	800	4-Lamp T8 32W 2x4 Recessed Prismatic Lens	4	106.7	2	0.21	171	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	4	14.5	2	0.03	23	0.18	148	\$26	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	5	\$1	\$240.00	\$95.00	\$335.00	\$80.00	9.99	\$50.00	\$50.00	\$100.00	FALSE	124.58
26	Teacher Workroom	4000	2-Lamp T8 17W 1x2 Ceiling-mounted Prismatic Wrap Lens	2	33	1	0.03	132	Existing to Remain	Existing to Remain	2	33	1	0.03	132	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	26	\$5	\$0.00	\$0.00	\$0.00	\$0.00	-	\$200.00	\$50.00	\$250.00	FALSE	54.74
2	Teacher Workroom	4000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	4	0.25	992	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	4	0.12	464	0.13	528	\$91	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	93	\$16	\$240.00	\$190.00	\$430.00	\$40.00	4.27	\$200.00	\$50.00	\$250.00	FALSE	15.57
26	Workroom Storage	400	2-Lamp T8 17W 1x2 Ceiling-mounted Prismatic Wrap Lens	2	33	1	0.03	13	Existing to Remain	Existing to Remain	2	33	1	0.03	13	0.00	0	\$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	3	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$50.00	\$50.00	\$100.00	FALSE	218.95
3	CR 234	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	12	0.35	905	0.69	1,785	\$309	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$31	\$1,080.00	\$570.00	\$1,650.00	\$120.00	4.96	\$200.00	\$50.00	\$250.00	FALSE	7.99
3	CR 236	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	12	0.35	905	0.69	1,785	\$309	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$31	\$1,080.00	\$570.00	\$1,650.00	\$120.00	4.96	\$200.00	\$50.00	\$250.00	\$35.00	6.87
3	CR 238	2600	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	12	1.03	2,689	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	12	0.35	905	0.69	1,785	\$309	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$31	\$1,080.00	\$570.00	\$1,650.00	\$120.00	4.96	\$200.00	\$50.00	\$250.00	\$35.00	6.87
1	Choral/Vocal Music	2600	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	19	1.64	4,258	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	19	0.83	2,149	0.81	2,109	\$365	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	430	\$74	\$1,710.00	\$902.50	\$2,612.50	\$190.00	6.64	\$200.00	\$50.00	\$250.00	\$35.00	2.89
1	Music Entrance	3000	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	2	0.17	517	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	2	0.09	261	0.09	256	\$44	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	52	\$9	\$180.00	\$95.00	\$275.00	\$20.00	5.75	\$200.00	\$50.00	\$250.00	FALSE	27.68
1	Music Storage	400	3-Lamp T8 32W 2x4 Recessed Parabolic Lens	3	86.2	4	0.34	138	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	43.5	4	0.17	70	0.17	68	\$12	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	14	\$2	\$360.00	\$190.00	\$550.00	\$40.00	43.15	\$50.00	\$50.00	\$100.00	FALSE	41.53
23	2nd Flr East Corridor	3000	2-Lamp T8 32W Recessed Prismatic Lens	2	62	17	1.05	3,162	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	17	0.49	1,479	0.56	1,683	\$291	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	3	20.0%	296	\$51	\$1,020.00	\$807.50	\$1,827.50	\$170.00	5.69	\$900.00	\$150.00	\$1,050.00	FALSE	20.52
3	SE Stairwell	3000	3-Lamp T8 32W 2x4 Recessed Prismatic Lens	3	86.2	6	0.52	1,552	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	3	29	6	0.17	522	0.34	1,030	\$178	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	104	\$18	\$540.00	\$285.00	\$825.00	\$60.00	4.29	\$600.00	\$100.00	\$700.00	FALSE	38.76
2	SE Stairwell	3000	2-Lamp T8 32W 1x4 Ceiling-mounted Prismatic Lens	2	62	1	0.06	186	Re-Lamp	Philips LED T8 InstaFit Lamp (14.5W)	2	29	1	0.03	87	0.03	99	\$17	4	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	17	\$3	\$60.00	\$47.50	\$107.50	\$10.00	5.69	\$600.00	\$100.00	\$700.00	FALSE	232.54
27	Exit 1	3000	70W MH White Wall-mounted Sconce	1	93	2	0.19	558	Replace	RAB White Wall Pak (#SLIM18W/PC2 18W LED)	1	18	2	0.04	108	0.15	450	\$78	0	No New Controls	0	0.0%	0	\$0	\$380.00	\$190.00	\$570.00	\$20.00	7.06	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT					RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS				LIGHTING RETROFIT COSTS				LIGHTING CONTROLS COST										
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
28	Exit 18	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 17	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 16	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
29	Ext. Wall (between Exit 16 & 15)	3000	90W Flood Light	1	90	1	0.09	270	Re-Lamp	Philips 19 Watt PAR 38 LED	1	19	1	0.02	57	0.07	213	\$37	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$47.50	\$77.50	\$10.00	1.83	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 14	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 13	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 12	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 11	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 10	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 9	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 8	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 7	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$275.00	\$95.00	\$370.00	\$10.00	21.68	\$0.00	\$0.00	\$0.00	FALSE	-
30	Exit 7	3000	70W MH Grey Wall-Mounted Hanging Sconce	1	93	1	0.09	279	Replace	RAB White Wall Pak #SLIM18W/PC2 18W LED	1	18	1	0.02	54	0.08	225	\$39	0	No New Controls	0	0.0%	0	\$0	\$190.00	\$95.00	\$285.00	\$10.00	7.06	\$0.00	\$0.00	\$0.00	FALSE	-
31	Exit 6	3000	26W Recessed Fluorescent Downlight	1	26	1	0.03	78	Re-Lamp	15 Watt Philips LED A21	1	15	1	0.02	45	0.01	33	\$6	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$190.00	\$310.00	\$10.00	52.55	\$0.00	\$0.00	\$0.00	FALSE	-
27	Exit 5	3000	70W MH White Wall-mounted Sconce	1	93	2	0.19	558	Replace	RAB White Wall Pak (#SLIM18W/PC2 18W LED)	1	18	2	0.04	108	0.15	450	\$78	0	No New Controls	0	0.0%	0	\$0	\$380.00	\$190.00	\$570.00	\$20.00	7.06	\$0.00	\$0.00	\$0.00	FALSE	-
31	Exit 5	3000	26W Recessed Fluorescent Downlight	1	26	1	0.03	78	Re-Lamp	15 Watt Philips LED A21	1	15	1	0.02	45	0.01	33	\$6	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$190.00	\$310.00	\$10.00	52.55	\$0.00	\$0.00	\$0.00	FALSE	-
27	Exit 4	3000	70W MH White Wall-mounted Sconce	1	93	2	0.19	558	Replace	RAB White Wall Pak (#SLIM18W/PC2 18W LED)	1	18	2	0.04	108	0.15	450	\$78	0	No New Controls	0	0.0%	0	\$0	\$950.00	\$475.00	\$1,425.00	\$20.00	18.05	\$0.00	\$0.00	\$0.00	FALSE	-
27	Wall between Exits 4 & 3	3000	70W MH White Wall-mounted Sconce	1	93	2	0.19	558	Replace	RAB White Wall Pak (#SLIM18W/PC2 18W LED)	1	18	2	0.04	108	0.15	450	\$78	0	No New Controls	0	0.0%	0	\$0	\$380.00	\$190.00	\$570.00	\$20.00	7.06	\$0.00	\$0.00	\$0.00	FALSE	-
32	Sidewalk Lights	3000	70W MH Low-Level Floodlights	1	93	5	0.47	1,395	Replace	RAB LED Floodlight (#FFLED26N/PC2)	1	26	5	0.13	390	0.34	1,005	\$174	0	No New Controls	0	0.0%	0	\$0	\$220.00	\$95.00	\$315.00	\$50.00	1.52	\$0.00	\$0.00	\$0.00	FALSE	-
27	Exit 3	3000	70W MH White Wall-mounted Sconce	1	93	2	0.19	558	Replace	RAB White Wall Pak (#SLIM18W/PC2 18W LED)	1	18	2	0.04	108	0.15	450	\$78	0	No New Controls	0	0.0%	0	\$0	\$190.00	\$95.00	\$285.00	\$20.00	3.40	\$0.00	\$0.00	\$0.00	FALSE	-
28	Exit 2	3000	2-Lamp 26W Wall-mounted CFL, Exterior light	2	52	1	0.05	156	Replace	Eaton 15" Terrapin LED TRF15-LD4 20 Watt	2	20	1	0.02	60	0.03	96	\$17	0	No New Controls	0	0.0%	0	\$0	\$5,775.00	\$1,995.00	\$7,770.00	\$10.00	467.24	\$0.00	\$0.00	\$0.00	FALSE	-
30	Exit 2	3000	70W MH Grey Wall-Mounted Hanging Sconce	1	93	1	0.09	279	Replace	RAB White Wall Pak #SLIM18W/PC2 18W LED	1	18	1	0.02	54	0.08	225	\$39	0	No New Controls	0	0.0%	0	\$0	\$190.00	\$95.00	\$285.00	\$10.00	7.06	\$0.00	\$0.00	\$0.00	FALSE	-
33	Roof	3000	70W MH Recessed Wall-washer Downlights	1	93	21	1.95	5,859	Re-Lamp	Philips 19 Watt PAR 38 LED with Mogul Base Adapter	1	19	21	0.40	1,197	1.55	4,662	\$807	0	No New Controls	0	0.0%	0	\$0	\$945.00	\$997.50	\$1,942.50	\$210.00	2.15	\$0.00	\$0.00	\$0.00	FALSE	-
34	Roof	3000	150W PAR38 Halogen Wall-mounted fixture	3	150	1	0.15	450	Re-Lamp	Philips LED PAR 38 Flood Lamp	1	34	1	0.03	102	0.12	348	\$60	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$47.50	\$107.50	\$10.00	1.62	\$0.00	\$0.00	\$0.00	FALSE	-
35	School	8760	Exit Sign Type 1 (White)	0	0	28	0.00	0	Existing to Remain	No Change	0	0	0	0.00	0	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$0.00	\$0.00	\$0.00	FALSE	-
36	School	8760	Exit Sign Type 2 (Clear)	0	0	19	0.00	0	Existing to Remain	No Change	0	0	0	0.00	0	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$0.00	\$0.00	\$0.00	FALSE	-
TOTAL						1,227	94.9	252,480					1,156	47.2	127,395	47.7	125,085	\$21,640			133		16,419	\$2,840	\$95,340	\$58,358	\$153,698	\$12,105	6.54	\$26,300	\$6,650	\$32,950	\$1,065.00	11.23