# MONTGOMERY TOWNSHIP SCHOOLS **UPPER MONTGOMERY MIDDLE SCHOOL** 375 BURNT HILL ROAD SKILLMAN, NJ 08558 **FACILITY ENERGY REPORT**

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#### I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider: Public Service Electric & Gas

Electric Utility Rate Structure: Large Power & Lighting Service (LPLS)

Third Party Supplier: South Jersey Energy Company

Natural Gas Utility Provider: South Jersey Natural Gas Utility Rate Structure: Large Volume Gas (LVG)

Third Party Supplier: Hess

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

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

# Table 1 Electricity Billing Data

# ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G

Rate: LPLS

Meter No: 778010776

Account # 42 010 276 00 & 662897408 Third Party Utility Provider: South Jersey Energy Company

TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Nov-10	96,960	302.4	\$14,281
Dec-10	87,601	278.4	\$12,919
Jan-11	95,281	283.2	\$13,789
Feb-11	95,282	283.2	\$13,789
Mar-11	90,002	302.4	\$13,207
Apr-11	81,360	333.6	\$11,310
May-11	99,840	436.8	\$17,445
Jun-11	96,720	458.4	\$17,321
Jul-11	72,240	223.2	\$11,686
Aug-11	66,240	235.2	\$11,139
Sep-11	126,720	225.6	\$16,443
Oct-11	42,480	410.4	\$6,937
Totals	1,050,726	458.4 Max	\$160,267

AVERAGE DEMAND 314.4 KW average AVERAGE RATE \$0.153 \$/kWh

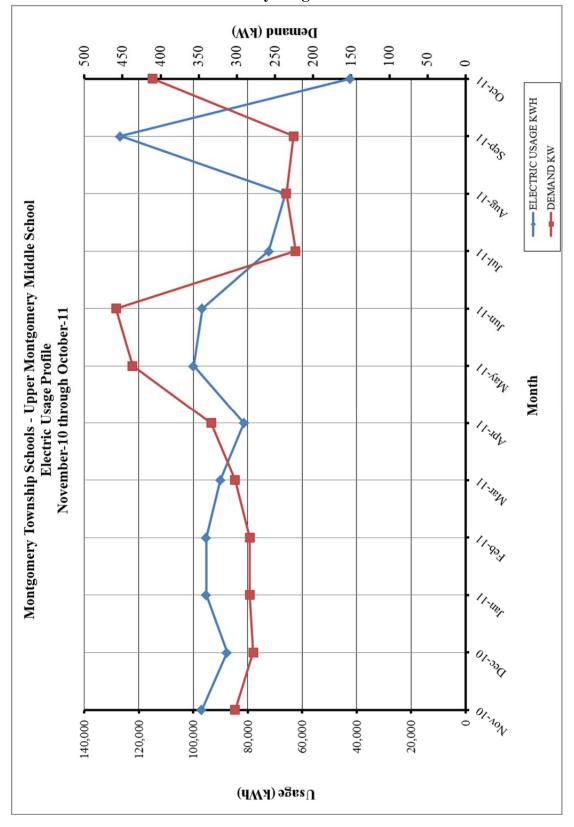


Figure 1 Electricity Usage Profile

# Table 4 Natural Gas Billing Data

# NATURAL GAS USAGE SUMMARY

Utility Provider: PSE&G

Rate: LVG Meter No: 3637649

Account Number 4201027600

Third Party Utility Provider: HESS

TPS Meter No: 359646/361974

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Nov-10	10,217.00	\$10,376.56
Dec-10	14,952.57	\$14,302.07
Jan-11	17,025.34	\$15,944.92
Feb-11	15,372.47	\$14,726.91
Mar-11	5,370.74	\$4,059.26
Apr-11	5,556.58	\$4,131.98
May-11	350.00	\$354.92
Jun-11	262.00	\$289.19
Jul-11	74.17	\$153.01
Aug-11	338.43	\$346.21
Sep-11	528.90	\$460.45
Oct-11	5,436.00	\$6,009.70
TOTALS	75,484.19	\$71,155.18
AVERAGE RATE:	\$0.94	\$/THERM

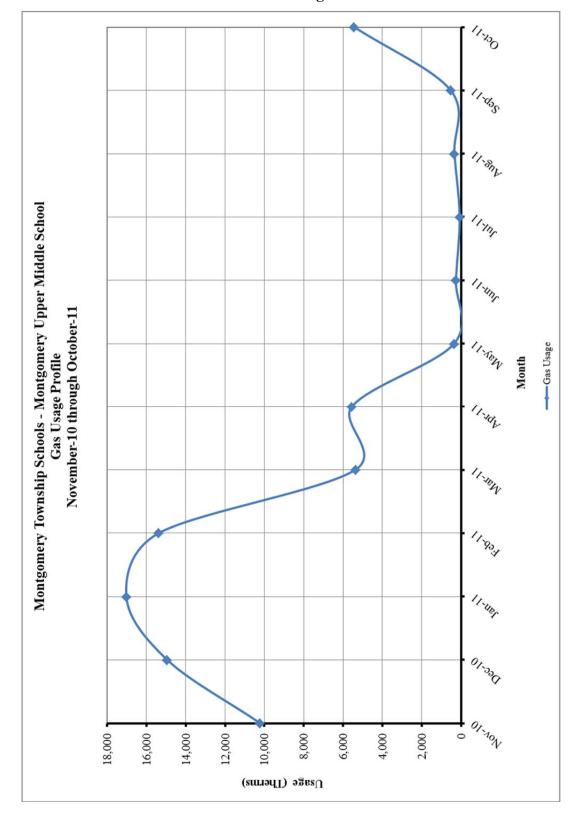


Figure 2 Natural Gas Usage Profile

#### II. FACILITY DESCRIPTION

The Montgomery Township Upper Middle School is located on 375 Burnt Hill Road in Skillman, New Jersey. The Upper Middle School was built in 1966 and later renovated in 1995 resulting in a total square footage of 142,000 for the facility.

#### Occupancy Profile

The typical hours of operation for the Upper Middle School are Monday through Friday from 7:30 am to 4:00 pm for students but further occupancy occurs from 4:30 pm to 11:00 pm for cleaning. The Upper Middle School is also occupied for long durations during Saturday and Sunday from approximately 9:00 am to 1:00 pm. The Upper Middle School employs approximately 103 people, with student enrollment estimated to be around 879.

#### **Building Envelope**

Exterior walls for the Middle School facility are a light brick face with concrete block construction. The exterior walls are setup for 4 inches of brick, 2 inches of cavity and 6 inches of block. The amount of insulation within the walls is not known, but is assumed to be typical for the time period in which it was built. The windows throughout the School have been recently installed due to a major window replacement plan at the facility. Typical windows throughout facility are double pane, ¼" tinted glass with aluminum frames. The majority of the roof is a flat, built up rubber roof with stone ballasts but the science wing has a flat built up rubber roof only. The amount of insulation below the roofing is unknown.

# **HVAC Systems**

The Upper Middle School is served by a mixture of packaged DX rooftop units and unit ventilators.

Heating is provided by four Aerco Benchmark 2.0 boilers in the mechanical room which serve the hot water unit ventilators and heating coils throughout the middle school. The boilers are gas-fired, hot water boilers with inputs of 2,000 MBH and outputs of approximately 1,800 MBH with an estimated efficiency of 88%. These boilers were installed 2009. All the boilers are within their useful service life as defined by ASHRAE. Hot water is circulated throughout the building's heating hot water loop via four base mounted, end suction pumps. Two 2 HP pumps are located in the mechanical room and are rated for 108 GPM at 36 feet of head. Two 10 HP pumps are located in the mechanical room and are rated for 410 GPM at 66 feet of head. All pump motors are standard efficiency Baldor motors.

Cooling for the Upper Middle School is provided by a variety of packaged rooftop units with DX coils manufactured by Trane, Lennox, York and McQuay. Cooling for the Gym and Cafeteria is provided by AAON rooftop heat recovery units with DX coils. These rooftop units are single zone, constant volume, which serve specific rooms and zones. Six (6) of the eighteen (18) rooftop units are in good condition and well within their useful service life as defined by ASHRAE. The remaining twelve (12) units are within the last year of their useful service life. Several classrooms as well as various office spaces are cooled using split system DX units.

Three (3) of the nine (9) split system condensing units are in good condition and well within their useful service life as defined by ASHRAE. The remaining six (6) are within the last year of their useful service life.

In addition to the air handling units, there are two air cooled chillers on the roof of the B-wing. These units provide chilled water to unit ventilators in the B-wing. The 80 ton McQuay air cooled chiller serves the 1<sup>st</sup> floor of the B-wing while the Trane R-Series air cooled chiller serves the 2<sup>nd</sup> floor B-wing. The McQuay chiller was installed in 2011 and therefore is within the ASHRAE useful service life. Conversely, the Trane chiller is approximately twenty years old and is within the last year of its ASHRAE useful service life.

# Exhaust System

Air is exhausted from the toilet rooms and corridors through the roof mounted exhaust fans.

#### **HVAC System Controls**

The HVAC systems throughout the facility are controlled via DDC controls as manufactured by Johnson. The building equipment operational status (on/off) and temperature set points are controlled through a central station terminal. Boilers are operated based on outside air temperature reset.

#### Domestic Hot Water

Domestic hot water for the building restrooms and kitchen is provided by one (1) AO Smith Cyclone XI domestic hot water boiler, located in the mechanical room. The hot water heater has a storage capacity of 130 gallons recovery rate of 465 gal/hr, with an input of 400 MBH.

#### Lighting

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

# III. MAJOR EQUIPMENT LIST

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

Refer to the Major Equipment List Appendix for this facility.

# IV. ENERGY CONSERVATION MEASURES

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

Table 1 ECM Financial Summary

ENERGY	ENERGY CONSERVATION MEASURES (ECM's)									
ECM NO.	DESCRIPTION	NET INSTALLATION COST <sup>A</sup>	ANNUAL SAVINGS <sup>B</sup>	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI					
ECM #1	Lighting Upgrade - General	\$23,584	\$7,324	3.2	365.8%					
ECM #2	Lighting Upgrade - Gym Lighting	\$6,000	\$1,060	5.7	164.9%					
ECM #3	Lighting Controls Upgrade	\$27,620	\$8,659	3.2	370.3%					
ECM #4	Split System Replacement	\$89,706	\$3,560	25.2	-40.5%					
ECM #5	Rooftop Unit Replacement	\$197,808	\$7,538	26.2	-42.8%					
ECM #6	VFD on HW Pumps	\$181,476	\$3,325	54.6	-72.5%					
ECM #7	HW Pump Motor Replacements	\$6,536	\$182	35.9	-49.9%					
Notes:	A. Cost takes into consideration B. Savings takes into consider			ves.						

Table 2 ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)							
		ANNUAL UTILITY REDUCTION					
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)			
ECM #1	Lighting Upgrade - General	19.0	47,869	0			
ECM #2	Lighting Upgrade - Gym Lighting	3	6,926	0			
ECM #3	Lighting Controls Upgrade	21.4	56,596	0			
ECM #4	Split System Replacement	0.0	23,271	0			
ECM #5	Rooftop Unit Replacement	0.0	49,266	0			
ECM #6	VFD on HW Pumps	0.0	21,737	0			
ECM #7	HW Pump Motor Replacements	0.5	1,193	0			

Table 3
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT							
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK		
Lighting Upgrade - General	\$7,324	\$23,584	\$0	\$23,584	3.2		
Lighting Upgrade - Gym Lighting	\$1,060	\$8,400	\$2,400	\$6,000	5.7		
Lighting Controls Upgrade	\$8,659	\$30,450	\$2,830	\$27,620	3.2		
Split System Replacement	\$3,560	\$94,250	\$4,544	\$89,706	25.2		
Rooftop Unit Replacement	\$7,538	\$203,500	\$5,692	\$197,808	26.2		
VFD on HW Pumps	<del>\$3,325</del>	<del>\$181,764</del>	<del>\$288</del>	<del>\$181,476</del>	<del>54.6</del>		
HW Pump Motor Replacements	\$182	\$6,856	\$320	\$6,536	35.9		
Design / Construction Extras (15%)		\$55,056		\$55,056			
Total Project	\$28,323	\$422,096	\$15,786	\$406,310	14.3		

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

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

# ECM #1: Lighting Upgrade – General

#### **Description:**

The majority of the interior lighting throughout Upper Middle School is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. CEG recommends, re-lamping all of the fixtures with 28W T8 lamps. In addition, the receiving area and a classroom area still have incandescent lamps. It is recommended to retrofit or replace all of the older fluorescent fixtures and the incandescent lights in these areas with newer fluorescent fixtures and compact fluorescent lamps.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. The ECM also includes retrofit of all older fluorescent fixtures with T8 or T5 fluorescent fixtures with electronic ballasts in the building. The new, energy efficient T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts.

The ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. In some locations the bulb replacement will need to be tested to make sure the larger base of the CFL will fit into the existing fixture. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burnhours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

#### **Energy Savings Calculations:**

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

ECM #1 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$23,584				
NJ Smart Start Equipment Incentive (\$):	\$0				
Net Installation Cost (\$):	\$23,584				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$7,324				
Total Yearly Savings (\$/Yr):	\$7,324				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	3.2				
Simple Lifetime ROI	365.8%				
Simple Lifetime Maintenance Savings	\$0				
Simple Lifetime Savings	\$109,864				
Internal Rate of Return (IRR)	30%				
Net Present Value (NPV)	\$63,852.54				

# **ECM #2: Lighting Upgrade - Gymnasium**

#### **Description:**

The main gymnasium, auxiliary gymnasium, weight room and wrestling gym at Upper Middle School is currently lit via twenty four HID, 400W, Metal Halide fixtures. The space would be better served with a more efficient, fluorescent lighting system. CE recommends upgrading the lighting to an energy-efficient T-5 lighting system that includes new lighting fixtures with high efficiency, electronic ballasts and T-5 high output (HO) lamps.

This measure replaces all the HID, 400 W HID MH fixtures with a well-designed T-5 lighting system. Twenty four, 6-lamp T5HO high bay fixtures with reflectors and high-efficiency, electronic ballasts will be required in order to meet the mandated 50 foot-candle average within the spaces.

# **Energy Savings Calculations:**

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

From the **Smart Start Incentive Appendix**, the replacement of a 400 W HID fixture to a T-5 or T-8 fixture warrants the following incentive: \$100 per fixture.

ECM #2 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$8,400				
NJ Smart Start Equipment Incentive (\$):	\$2,400				
Net Installation Cost (\$):	\$6,000				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$1,060				
Total Yearly Savings (\$/Yr):	\$1,060				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	5.7				
Simple Lifetime ROI	164.9%				
Simple Lifetime Maintenance Savings	\$0				
Simple Lifetime Savings	\$15,896				
Internal Rate of Return (IRR)	16%				
Net Present Value (NPV)	\$6,651.11				

# ECM #3: Lighting Controls Upgrade – Occupancy Sensors

#### **Description:**

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

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

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

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

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

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

#### **Energy Savings Calculations:**

Energy Savings = (% Savings × Controlled Light Energy (kWh/Yr))

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

# **Rebates and Incentives:**

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

# **Smart Start Incentive**

- = (# Wall mount sensors × \$20 per sensor)
- + (# Ceiling mount sensors × \$35 per sensor)

ECM #3 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$30,450				
NJ Smart Start Equipment Incentive (\$):	\$2,830				
Net Installation Cost (\$):	\$27,620				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$8,659				
Total Yearly Savings (\$/Yr):	\$8,659				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	3.2				
Simple Lifetime ROI	370.3%				
Simple Lifetime Maintenance Savings	\$0				
Simple Lifetime Savings	\$129,885				
Internal Rate of Return (IRR)	31%				
Net Present Value (NPV)	\$75,750.58				

# **ECM #4: Split Systems Replacement**

#### **Description:**

The Montgomery Township Upper Middle School has several split systems throughout the school which condition single zones. These units are also approaching their ASHRAE service life and should be considered for replacement in the near future.

The units currently installed are a lower efficiency compared to modern units. These units can be replaced with new high efficiency units. New condensing units provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and higher efficiency refrigerants such as R410A which would be used in place of R22 that are currently used in the units.

This ECM includes one-for-one replacement of the older split systems with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacement for this ECM can be found in the table below:

IMPLEMENTATION SUMMARY								
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH			
Trane SS	AC-1,2	2	180,000	30.0	Trane Odyssey			
Fujitsu SS	AC-3	1	36,000	3.0	Trane Odyssey			
Trane SS	AC-4	1	102,000	8.5	Trane Odyssey			
Armstrong SS	AC-5	1	90,000	7.5	Trane Odyssey			
York SS	AC-6	1	120,000	10.0	Trane Odyssey			
Total		6	528,000	59.0				

The manufacturers used as the basis for the calculation is Trane. The unit pricing and install cost were estimated based on current rates quotes and labor rates. The payback may change based on actual unit pricing and install costs if the ECM is implemented.

#### **Energy Savings Calculations:**

#### **Cooling Energy Savings:**

Seasonal energy consumption of the air conditioners at the cooling mode is calculated with the equation below:

$$\text{Energy Savings, kWh} \ = \text{Cooling Capacity,} \\ \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{SEER}_{\text{Old}}} - \frac{1}{\text{SEER}_{\text{New}}}\right) \times \frac{\text{Operation Hours}}{1000 \frac{\text{W}}{\text{kWh}}}$$

Demand Savings, 
$$kW = \frac{Energy Savings (kWh)}{Hours of Cooling}$$

Cooling Cost Savings = Energy Savings, kWh × Cost of Electricity 
$$\left(\frac{\$}{\text{kWh}}\right)$$

	ENERGY SAVINGS CALCULATIONS								
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS EER	SPLIT UNITS EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW		
Trane SS	180,000	1,200	9.5 EER	12.6 EER	2	11,188	9.3		
Fujitsu SS	36,000	1,200	10.5 SEER	14 SEER	1	1,029	0.9		
Trane SS	102,000	1,200	9 EER	12.2 EER	1	3,567	3.0		
Armstrong SS	90,000	1,200	9 EER	12.4 EER	1	3,290	2.7		
York SS	120,000	1,200	9 EER	12.2 EER	1	4,197	3.5		
Total					6	23,271	19.4		

# **Project Cost, Incentives and Maintenance Savings**

From the **NJ Smart Start® Program appendix**, the replacement of split system AC units and unitary systems with high efficiency AC systems falls under the category "Unitary HVAC Split System" and warrants an incentive based on efficiency (EER/SEER). The program incentives are calculated as follows:

SmartStart® Incentive=(CoolingTons× \$/TonIncentive)

SPLIT SYSTEM AC UNITS REBATE SUMMARY								
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$				
≥20 to 30 tons	10.5 EER	79	0	\$0				
$\geq$ 11.25 to < 20 tons	11.5 EER	79	30	\$2,370				
$\geq$ 5.4 to $<$ 11.25 tons	11.5 EER	73	26	\$1,898				
5.4 tons or less Unitary AC and Split System	≥14 SEER	\$92	3.0	\$276				
TOTAL			59	\$4,544				

Summary of cost, savings and payback for this ECM is below.

	COST & SAVINGS SUMMARY								
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS		
Trane SS	\$20,250	2	\$40,500	\$2,370	\$38,130	\$1,712	22.3		
Fujitsu SS	\$7,250	1	\$7,250	\$276	\$6,974	\$157	44.3		
Trane SS	\$14,750	1	\$14,750	\$621	\$14,130	\$546	25.9		
Armstrong SS	\$14,750	1	\$14,750	\$548	\$14,203	\$503	28.2		
York SS	\$17,000	1	\$17,000	\$730	\$16,270	\$642	25.3		
Total	\$74,000	6	\$94,250	\$4,544	\$89,706	\$3,560	25.2		

There is no significant maintenance savings due to implementation of this ECM.

ECM #4 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$94,250				
NJ Smart Start Equipment Incentive (\$):	\$4,544				
Net Installation Cost (\$):	\$89,706				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$3,560				
Total Yearly Savings (\$/Yr):	\$3,560				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	25.2				
Simple Lifetime ROI	-40.5%				
Simple Lifetime Maintenance Savings	\$0				
Simple Lifetime Savings	\$53,400				
Internal Rate of Return (IRR)	-6%				
Net Present Value (NPV)	(\$47,206.95)				

# **ECM #5: Replace Rooftop Units with High Efficiency Units**

#### **Description:**

The Montgomery Township Upper Middle School has several packaged rooftop systems throughout the school which condition single zones. These units are also approaching their ASHRAE service life and should be considered for replacement in the near future.

The unit is in good condition though the current unit in operation is not a high efficiency unit. The unit was recently replaced and is only two years old.

The unit currently installed is a lower efficiency compared to a modern unit. The unit can be replaced with a new high efficiency unit. New condensing units provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and higher efficiency refrigerants such as R410A which would be used in place of R22 that is currently used in the unit.

This ECM includes one-for-one replacement of the older condensing unit with a new higher efficiency system. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacement for this ECM can be found in the table below:

	IMPLEMENTATION SUMMARY								
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH				
RTU	RTU - E1,E3	2	48,000	4.0	THC048				
RTU	RTU - E4,E5,E7,E8	4	75,000	6.3	THC090				
RTU	RTU - E6	1	60,000	5.0	THC060				
RTU	RTU - E9	1	600,000	50.0	TCD600				
RTU	RTU - E10,E11	2	60,000	5.0	THC060				
RTU	RTU - E12	1	48,000	4.0	THC048				
RTU	RTU - E13	1	210,000	17.5					
Total		12	1,101,000	92					

The manufacturers used as the basis for the calculation is Trane. The unit pricing and install cost were estimated based on current rates quotes and labor rates. The payback may change based on actual unit pricing and install costs if the ECM is implemented.

# **Energy Savings Calculations:**

# **Cooling Energy Savings:**

Seasonal energy consumption of the air conditioners at the cooling mode is calculated with the equation below:

Energy Savings, kWh = Cooling Capacity, 
$$\frac{BTU}{Hr} \times \left(\frac{1}{SEER_{Old}} - \frac{1}{SEER_{New}}\right) \times \frac{Operation Hours}{1000 \frac{W}{kWh}}$$

Demand Savings, kW = 
$$\frac{\text{Energy Savings (kWh)}}{\text{Hours of Cooling}}$$

Cooling Cost Savings = Energy Savings, kWh × Cost of Electricity 
$$\left(\frac{\$}{\text{kWh}}\right)$$

	ENERGY SAVINGS CALCULATIONS								
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS EER	SPLIT UNITS EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW		
RTU	48,000	1,200	9 EER	12.5 EER	2	3,584	3.0		
RTU	75,000	1,200	9 EER	13 EER	4	12,308	10.3		
RTU	60,000	1,200	9 EER	12.85 EER	1	2,397	2.0		
RTU	600,000	1,200	9 EER	11.5 EER	1	17,391	14.5		
RTU	60,000	1,200	9 EER	12.85 EER	2	4,794	4.0		
RTU	48,000	1,200	9 EER	12.5 EER	1	1,792	1.5		
RTU	210,000	1,200	9 EER	12 EER	1	7,000	5.8		
Total					2	49,266	41.1		

# **Project Cost, Incentives and Maintenance Savings**

From the **NJ Smart Start**<sup>®</sup> **Program appendix**, the replacement of split system AC units and unitary systems with high efficiency AC systems falls under the category "Unitary HVAC Split System" and warrants an incentive based on efficiency (EER/SEER). The program incentives are calculated as follows:

SmartStart® Incentive=(CoolingTons× \$/TonIncentive)

S	SPLIT SYSTEM AC UNITS REBATE SUMMARY								
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$					
≥20 to 30 tons	10.5 EER	79	0	\$0					
$\geq$ 11.25 to $\leq$ 20 tons	11.5 EER	79	17.5	\$1,383					
$\geq$ 5.4 to $<$ 11.25 tons	11.5 EER	73	25	\$1,825					
5.4 tons or less Unitary AC and Split System	≥14 SEER	\$92	27.0	\$2,484					
TOTAL			69.5	\$5,692					

Summary of cost, savings and payback for this ECM is below.

	COST & SAVINGS SUMMARY								
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS		
RTU	\$22,000	2	\$22,000	\$736	\$21,264	\$548	38.8		
RTU	\$50,000	4	\$50,000	\$1,825	\$48,175	\$1,883	25.6		
RTU	\$12,500	1	\$12,500	\$460	\$12,040	\$367	32.8		
RTU	\$55,000	1	\$55,000	\$0	\$55,000	\$2,661	20.7		
RTU	\$25,000	2	\$25,000	\$920	\$24,080	\$733	32.8		
RTU	\$11,000	1	\$11,000	\$368	\$10,632	\$274	38.8		
RTU	\$26,000	1	\$26,000	\$1,383	\$24,618	\$1,071	23.0		
Total	\$201,500	12	\$201,500	\$5,692	\$195,809	\$7,538	26.0		

There is no significant maintenance savings due to implementation of this ECM.

ECM #5 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$203,500				
NJ Smart Start Equipment Incentive (\$):	\$5,692				
Net Installation Cost (\$):	\$197,808				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$7,538				
Total Yearly Savings (\$/Yr):	\$7,538				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	26.2				
Simple Lifetime ROI	-42.8%				
Simple Lifetime Maintenance Savings	\$0				
Simple Lifetime Savings	\$113,070				
Internal Rate of Return (IRR)	-6%				
Net Present Value (NPV)	(\$107,819.85)				

# ECM #6: Install VFD on Hot Water Pumps

#### **Description:**

The hot water system at the Upper Middle School utilizes four constant speed pumps to circulate hot water from the boiler plant throughout the building. Based on the survey of the existing equipment it appears that the hot water unit ventilators have 3-way control valves for flow control. 3-way control valves allow constant flow of the water loop, requiring full pumping energy continuously, unlike 2-way control valves that provide flow through the heat exchanger equipment only when there is a call for heating, and allow the system to reduce flow when it is not needed.

This ECM includes the installation of Variable Frequency Drives on the two, 2 horsepower existing hot water pumps and two, 10 horsepower existing hot water pumps. The VFD control is based on a differential pressure sensor in the water loop to measure demand for water. This ECM also includes replacement of the existing pump motors with inverter duty motors that meet NEMA Premium Efficiency Standard, which also helps to reduce energy consumption. Additionally, the 3-way control valves must be replaced in all the unit ventilators throughout the system to enable the variable volume system to function properly.

#### **Energy Savings Calculations:**

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

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

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

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

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

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

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

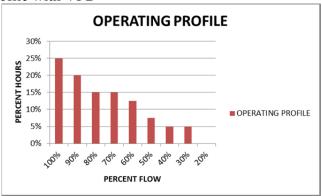
# VFD Calculation for 10 Horsepower Pumps

HOT WATER SET #1 PUMPS VFD CALULATION							
EXISTING	PROPOSED	SAVINGS					
CV Pumps	VFD Pumps						
Throttle	VFD	-					
10.0	10.0						
410	410	-					
66	66	-					
75.0%	75.0%	-					
89.5%	91.7%	2.2%					
5054	5054	-					
10.2	9.9	0.24					
0.153	0.153	-					
AVINGS CALO	CULATIONS						
EXISTING	PROPOSED	SAVINGS					
42,884	23,229	19,655					
\$6,561	\$3,554	\$3,007					
	EXISTING  CV Pumps  Throttle  10.0  410  66  75.0%  89.5%  5054  10.2  0.153  AVINGS CALCE  EXISTING  42,884	EXISTING         PROPOSED           CV Pumps         VFD Pumps           Throttle         VFD           10.0         10.0           410         410           66         66           75.0%         75.0%           89.5%         91.7%           5054         5054           10.2         9.9           0.153         0.153           AVINGS CALCULATIONS           EXISTING         PROPOSED           42,884         23,229					

# VFD Calculation for 10 Horsepower Pumps

HOT WATER SET #2 PUMPS VFD CALULATION							
ECM INPUTS	EXISTING	PROPOSED	SAVINGS				
ECM INPUTS	CV Pumps	VFD Pumps					
Flow Control	Throttle	VFD	-				
Motor Nameplate HP	2.0	2.0					
Flow* (GPM)	108	108	-				
Head* (Ft)	36	36	-				
Pump Efficiency (%)	75.0%	75.0%	-				
Motor Efficiency (%)	84.0%	86.5%	2.5%				
Operating Hrs	5054	5054	-				
Estimated Power (HP)	1.6	1.5	0.05				
Elec Cost (\$/kWh)	0.153	0.153	-				
ENERGYS	AVINGS CALO	CULATIONS					
ECM RESULTS	EXISTING	PROPOSED	SAVINGS				
Electric Energy (kWh)	6,995	4,913	2,082				
Electric Energy Cost (\$)	\$1,070	\$752	\$318				
COMMENTS:							

Estimated Operating Profile with VFD



ECM #6 - ENERGY SAVINGS SUMMARY					
Installation Cost (\$):	\$181,764				
NJ Smart Start Equipment Incentive (\$):	\$288				
Net Installation Cost (\$):	\$181,476				
Maintenance Savings (\$/Yr):	\$0				
Energy Savings (\$/Yr):	\$3,325				
Total Yearly Savings (\$/Yr):	\$3,325				
Estimated ECM Lifetime (Yr):	15				
Simple Payback	54.6				
Simple Lifetime ROI	-72.5%				
Simple Lifetime Maintenance Savings	0				
Simple Lifetime Savings	\$49,875				
Internal Rate of Return (IRR)	-13%				
Net Present Value (NPV)	(\$141,782.37)				

# **ECM #7: Install NEMA Premium® Efficiency Motors**

# **Description:**

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

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

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

EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
P-1	Hot Water Pumps	2	2,527	84.0%	86.5%
P-2	Hot Water Pumps	2	2,527	84.0%	86.5%
P-3	Hot Water Pumps	10	2,527	89.5%	92.4%
P-4	Hot Water Pumps	10	2,527	89.5%	92.4%

# **Energy Savings Calculations:**

$$Electric usage, kWh = \frac{HP \times LF \times 0.746 \times Hours of Operation}{Motor Efficiency}$$

where, HP = Motor Nameplate Horsepower Rating

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

$$\begin{aligned} & \text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}} \\ & \text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate}\left(\frac{\$}{\text{kWh}}\right) \end{aligned}$$

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

PREMIUM E	PREMIUM EFFICIENCY MOTOR CALCULATIONS								
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	I COST I		
P-1	2	75%	84.0%	86.5%	0.04	98	\$15		
P-2	2	75%	84.0%	86.5%	0.04	98	\$15		
P-3	10	75%	89.5%	92.4%	0.20	498	\$76		
P-4	10	75%	89.5%	92.4%	0.20	498	\$76		
TOTAL					0.5	1,193	\$182		

# **Equipment Cost and Incentives**

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

INCENTIVES								
HORSE POWER	NJ SMART START INCENTIVE							
5	\$60							
7.5	\$90							
10	\$100							
15	\$115							
20	\$125							
25	\$130							

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

MOTOR REPLACEMENT SUMMARY										
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK				
P-1	2	\$868	\$60	\$808	\$15	54.0				
P-2	2	\$868	\$60	\$808	\$15	54.0				
P-3	10	\$2,560	\$100	\$2,460	\$76	32.3				
P-4	10	\$2,560	\$100	\$2,460	\$76	32.3				
TOTAL	Totals:	\$6,856	\$320	\$6,536	\$182	35.8				

ECM #7 - ENERGY SAVINGS SUMMARY									
Installation Cost (\$):	\$6,856								
NJ Smart Start Equipment Incentive (\$):	\$320								
Net Installation Cost (\$):	\$6,536								
Maintenance Savings (\$/Yr):	\$0								
Energy Savings (\$/Yr):	\$182								
Total Yearly Savings (\$/Yr):	\$182								
Estimated ECM Lifetime (Yr):	18								
Simple Payback	35.9								
Simple Lifetime ROI	-49.9%								
Simple Lifetime Maintenance Savings	\$0								
Simple Lifetime Savings	\$3,276								
Internal Rate of Return (IRR)	-6%								
Net Present Value (NPV)	(\$4,032.86)								

#### V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall systempowerusage and maintain better IAQ.
- E. Turn off computers when not in use. Ensure computers are not running in screen saver mode which saves the monitor screen not energy.
- F. Ensure outside air dampers are functioning properly and only open during occupied mode

Appendix Energy Audit APPENDIX A Concord Engineering Group, Inc.

#### ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Upper Montgomery Township BOE - Upper Montgomery Middle School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST			YEARLY SAVINGS			ECM	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)	
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT./ SREC	TOTAL	LIFETIME	(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^{n_i}}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^{n}}$
		(\$)	(\$)	(\$)	( <b>\$</b> )	(\$/Yr)	(\$/Yr)	(\$/Yr)	(Yr)	(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade - General	\$23,584	\$0	\$0	\$23,584	\$7,324	\$0	\$7,324	15	\$109,864	\$0	365.8%	3.2	30.48%	\$63,852.54
ECM #2	Lighting Upgrade - Gym Lighting	\$8,400	\$0	\$2,400	\$6,000	\$1,060	\$0	\$1,060	15	\$15,896	\$0	164.9%	5.7	15.67%	\$6,651.11
ECM #3	Lighting Controls Upgrade	\$30,450	\$0	\$2,830	\$27,620	\$8,659	\$0	\$8,659	15	\$129,885	\$0	370.3%	3.2	30.79%	\$75,750.58
ECM #4	Split System Replacement	\$48,750	\$45,500	\$4,544	\$89,706	\$3,560	\$0	\$3,560	15	\$53,400	\$0	-40.5%	25.2	-5.88%	(\$47,206.95)
ECM #5	Rooftop Unit Replacement	\$135,500	\$68,000	\$5,692	\$197,808	\$7,538	\$0	\$7,538	15	\$113,070	\$0	-42.8%	26.2	-6.29%	(\$107,819.85)
ECM #6	VFD on HW Pumps	\$54,951	\$126,813	\$288	\$181,476	\$3,325	\$0	\$3,325	15	\$49,875	\$0	-72.5%	54.6	-13.02%	(\$141,782.37)
ECM #7	HW Pump Motor Replacements	\$6,856	\$0	\$320	\$6,536	\$182	\$0	\$182	18	\$3,276	\$0	-49.9%	35.9	-6.43%	(\$4,032.86)

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 rol to N periods where N is the lifetime of ECM and Cn is the cash flow during each period.

Appendix Energy Audit **APPENDIX B** Concord Engineering Group, Inc.

# Concord Engineering Group, Inc.

CONCORD ENERGY SERVICES

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

PHONE: (856) 427-0200 FAX: (856) 427-6508

#### **SmartStart Building Incentives**

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

#### **Electric Chillers**

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

Energy Efficiency must comply with ASHRAE 90.1-2007

#### **Gas Cooling**

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

#### **Desiccant Systems**

\$1.00 per cfm – gas or electric
----------------------------------

#### **Electric Unitary HVAC**

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

Energy Efficiency must comply with ASHRAE 90.1-2007

#### **Gas Heating**

	8
Gas Fired Boilers < 300 MBH	\$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	\$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	\$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	\$300 - \$400 per unit, AFUE $\ge$ 92%

#### **Ground Source Heat Pumps**

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

Energy Efficiency must comply with ASHRAE 90.1-2007

#### **Variable Frequency Drives**

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

#### **Natural Gas Water Heating**

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

# **Prescriptive Lighting**

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

# **Prescriptive Lighting - LED**

Trescriptive E	8 8
LED New Exit Sign Fixture Existing Facility < 75 kw Existing Facility > 75 kw	\$20 per fixture \$10 per fixture
LED Display Case Lighting	\$30 per display case
LED Shelf-Mtd. Display & Task Lights	\$15 per linear foot
LED Portable Desk Lamp	\$20 per fixture
LED Wall-wash Lights	\$30 per fixture
LED Recessed Down Lights	\$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	\$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	\$150 per fixture
LED High-Bay-Aisle Lighting	\$150 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Linear Panels (2x2 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

**Lighting Controls – Occupancy Sensors** 

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

#### **Lighting Controls – HID or Fluorescent Hi-Bay Controls**

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

#### **Premium Motors**

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

**Other Equipment Incentives** 

3 til 2 qui più til 3 ti			
Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2007 for New Construction and Complete Renovation		
Custom Electric and Gas Equipment Incentives	not prescriptive		
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings.  Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.		
Multi Measures Bonus	15%		

Appendix Energy Audit APPENDIX C Concord Engineering Group, Inc.



#### STATEMENT OF ENERGY PERFORMANCE **Upper Middle School**

**Building ID: 1498464** 

For 12-month Period Ending: November 30, 20111

Date SEP becomes ineligible: N/A

Date SEP Generated: February 16, 2012

**Facility** 

Upper Middle School 375 Burnt Hill Road Skillman, NJ 08558

**Facility Owner** 

Montgomery Township BOE 1014 Route 601 Skillman, NJ 08558

**Primary Contact for this Facility** 

Thomas Venanzi 1014 Route 601 Skillman, NJ 08558

Year Built: 1969

Gross Floor Area (ft2): 142,350

Energy Performance Rating<sup>2</sup> (1-100) 71

Site Energy Use Summary<sup>3</sup>

Electricity - Grid Purchase(kBtu) 3,333,325 Natural Gas (kBtu)4 7,338,817 Total Energy (kBtu) 10,672,142

Energy Intensity<sup>4</sup>

Site (kBtu/ft²/yr) 75 Source (kBtu/ft²/yr) 132

Emissions (based on site energy use) Greenhouse Gas Emissions (MtCO2e/year) 862

**Electric Distribution Utility** 

Public Service Electric & Gas Co

**National Median Comparison** 

National Median Site EUI 91 National Median Source EUI 160 % Difference from National Median Source EUI -17% **Building Type** K-12 School Stamp of Certifying Professional

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

Meets Industry Standards<sup>5</sup> for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality N/A Acceptable Thermal Environmental Conditions N/A Adequate Illumination N/A Certifying Professional John Marchiafava

520 S. Burnt Mill Rd. Voorhees, NJ 08043

- 1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.

- 2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.

  3. Values represent energy consumption, annualized to a 12-month period.

  4. Values represent energy intensity, annualized to a 12-month period.

  5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

# ENERGY STAR® Data Checklist for Commercial Buildings

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

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

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

VALUE AS ENTERED IN

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	$\overline{\mathbf{V}}$
Building Name	Upper Middle School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		
Туре	K-12 School	Is this an accurate description of the space in question?		
Location	375 Burnt Hill Road, Skillman, NJ 08558	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		
Upper Middle School (				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	$\overline{\mathbf{A}}$
Gross Floor Area	142,350 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		
Number of PCs	371	Is this the number of personal computers in the K12 School?		
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		
Percent Cooled	60 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		

High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		
(UMS) Parking Lot (Pa	arking)			
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	$\overline{\mathbf{V}}$
Gross Floor Area	140,000 Sq. Ft.	Is this the total square footage of the entire parking area (enclosed + nonenclosed + open floor area)?		
Enclosed Floor Area	0 Sq. Ft.	Is this the total square footage of the enclosed garage space? An enclosed garage is defined as having both sides and a roof.		
Non-Enclosed Floor Area (w/roof)	0 Sq. Ft.	Is this the total square footage of the nonenclosed garage space? This is typically defined as the portion of the garage above ground (contains no sides but is under a roof).		
Open Floor Area (w/o roof)	140,000 Sq. Ft.	Is this the total square footage of the nonenclosed parking area without a roof? This is typically defined as open parking lots or the very top level of an above ground parking garage.		
Weekly Hours of Access	168 Hours	Is this the total number of hours per week when it is possible for a vehicle to enter or exit?		

# ENERGY STAR® Data Checklist for Commercial Buildings

#### **Energy Consumption**

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

Meter: E-62-107-080-13 (kWh (thousand Watt-hours)) Space(s): Upper Middle School Generation Method: Grid Purchase			
Start Date	Energy Use (kWh (thousand Watt-hours		
10/08/2011	11/07/2011	42,480.00	
09/08/2011	10/07/2011	126,720.00	
08/08/2011	09/07/2011	66,240.00	
07/08/2011	08/07/2011	72,240.00	
06/08/2011	07/07/2011	96,720.00	
05/08/2011	06/07/2011	99,840.00	
04/08/2011	05/07/2011	81,360.00	
03/08/2011	04/07/2011	90,000.00	
02/08/2011	03/07/2011	95,280.00	
01/08/2011	02/07/2011	95,280.00	
12/08/2010	01/07/2011	87,600.00	
62-107-080-13 Consumption (kWh (thousand Wa	953,760.00		
52-107-080-13 Consumption (kBtu (thousand Btu	3,254,229.12		
G	2-127-463-54 (kWh (thousand W Space(s): Upper Middle School eneration Method: Grid Purchas	e	
Start Date	Space(s): Upper Middle School eneration Method: Grid Purchas End Date	Energy Use (kWh (thousand Watt-hour	
Start Date 10/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas End Date 11/07/2011	Energy Use (kWh (thousand Watt-hour	
Start Date 10/08/2011 09/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas End Date 11/07/2011 10/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00	
Start Date 10/08/2011 09/08/2011 08/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas End Date 11/07/2011 10/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00  2.00	
Start Date 10/08/2011 09/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas End Date 11/07/2011 10/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  08/07/2011  07/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00  2.00  0.00  0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  09/07/2011  08/07/2011	Energy Use (kWh (thousand Watt-hours 1.00 2.00 2.00 0.00 0.00 0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  08/07/2011  07/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00  2.00  0.00  0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011 05/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  09/07/2011  07/07/2011  06/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00  2.00  0.00  0.00  0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011 05/08/2011 04/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  09/07/2011  08/07/2011  06/07/2011  05/07/2011	Energy Use (kWh (thousand Watt-hour 1.00 2.00 2.00 0.00 0.00 0.00 0.00 0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011 05/08/2011 04/08/2011 03/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  09/07/2011  07/07/2011  06/07/2011  05/07/2011  04/07/2011	Energy Use (kWh (thousand Watt-hour  1.00  2.00  2.00  0.00  0.00  0.00  0.00  0.00  0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011 05/08/2011 04/08/2011 03/08/2011 03/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  08/07/2011  06/07/2011  05/07/2011  04/07/2011  03/07/2011	Energy Use (kWh (thousand Watt-hours 1.00 2.00 2.00 0.00 0.00 0.00 0.00 0.00	
Start Date 10/08/2011 09/08/2011 08/08/2011 07/08/2011 06/08/2011 05/08/2011 04/08/2011 03/08/2011 02/08/2011 01/08/2011	Space(s): Upper Middle School eneration Method: Grid Purchas  End Date  11/07/2011  10/07/2011  09/07/2011  08/07/2011  06/07/2011  05/07/2011  04/07/2011  03/07/2011  02/07/2011  01/07/2011	Energy Use (kWh (thousand Watt-hour 1.00 2.00 2.00 0.00 0.00 0.00 0.00 0.00	

Fuel Type: Natural Gas		
, , , , , , , , , , , , , , , ,	Meter: G-62-107-080-13 (therms)	
	Space(s): Upper Middle School	
Start Date	End Date	Energy Use (therms)
10/08/2011	11/07/2011	5,436.00
09/08/2011	10/07/2011	529.00
08/08/2011	09/07/2011	338.00
07/08/2011	08/07/2011	74.00
06/08/2011	07/07/2011	262.00
05/08/2011	06/07/2011	350.00
04/08/2011	05/07/2011	5,557.00
03/08/2011	04/07/2011	5,371.00
02/08/2011	03/07/2011	15,373.00
01/08/2011	02/07/2011	17,025.00
12/08/2010	01/07/2011	14,953.00
G-62-107-080-13 Consumption (therms)		65,268.00
G-62-107-080-13 Consumption (kBtu (thousand B	tu))	6,526,800.00
Total Natural Gas Consumption (kBtu (thousand	Btu))	6,526,800.00
s this the total Natural Gas consumption at this b	ouilding including all Natural Gas meters?	
Additional Fuels Do the fuel consumption totals shown above represer	nt the total energy use of this building?	
Please confirm there are no additional fuels (district e		
On-Site Solar and Wind Energy Oo the fuel consumption totals shown above include a	all on-site solar and/or wind nower located at	
our facility? Please confirm that no on-site solar or w st. All on-site systems must be reported.		
Cand Calina Day Canal Care		
Certifying Professional (When applying for the ENERGY STAR, the Certifying	g Professional must be the same PF or RA that sig	ned and stamped the SEP )
	_	
Name:	Date:	
Signature:		

Signature is required when applying for the ENERGY STAR.

#### FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

**Facility** 

Upper Middle School 375 Burnt Hill Road Skillman, NJ 08558 **Facility Owner** 

Montgomery Township BOE 1014 Route 601 Skillman, NJ 08558 **Primary Contact for this Facility** 

Thomas Venanzi 1014 Route 601 Skillman, NJ 08558

Parking 140,000 0 0 140,000 168

#### **General Information**

Upper Middle School			
Gross Floor Area Excluding Parking: (ft²)	142,350		
Year Built	1969		
For 12-month Evaluation Period Ending Date:	November 30, 2011		

**Facility Space Use Summary** 

racinty space use summ	ııaı y		
Upper Middle School		(UMS) Parking Lot	
Space Type	K-12 School	Space Type	
Gross Floor Area(ft2)	142,350	Gross Floor Area(ft²)	Г
Open Weekends?	Yes	Enclosed Floor Area	Г
Number of PCs	371	Non-Enclosed Floor Area (w/roof)	Г
Number of walk-in refrigeration/freezer	_	Open Floor Area (w/o roof)	Г
units	2	Weekly Hours of Access	т
Presence of cooking facilities	Yes	Treesky risule erriceses	_
Percent Cooled	60		
Percent Heated	100		
Months <sup>o</sup>	12		
High School?	No		
School District <sup>o</sup>	N/A		

**Energy Performance Comparison** 

	Evaluatio	Comparisons			
Performance Metrics	Current (Ending Date 11/30/2011)	Baseline (Ending Date 09/30/2006)	Rating of 75	Target	National Median
Energy Performance Rating	71	23	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	75	109	72	N/A	91
Source (kBtu/ft²)	132	200	128	N/A	160
Energy Cost					
\$/year	N/A	N/A	N/A	N/A	N/A
\$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO₂e/year	862	1,295	832	N/A	1,046
kgCO <sub>2</sub> e/ft²/year	6	9	6	N/A	7

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

Notes:

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

# Statement of Energy Performance

2011

Upper Middle School 375 Burnt Hill Road Skillman, NJ 08558

Portfolio Manager Building ID: 1498464

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

This building's score

1 50 100

Least Efficient Median Most Efficient

This building uses 132 kBtu per square foot per year.\*

\*Based on source energy intensity for the 12 month period ending November 2011

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

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

Date of certification



Date Generated: 02/16/2012

Appendix Energy Audit APPENDIX D Concord Engineering Group, Inc.

#### **Concord Engineering Group**

#### **Montgomery Township - Upper Montgomery Middle School**

#### **AC Units**

Tag	RTU-1,3	RTU-2	RTU-E1,E3
Unit Type	Rooftop Unit	Rooftop Unit	Rooftop Unit
Qty	2	1	2
Location	Roof Adjacent to Gym	Roof Adjacent to Gym	E-Wing Roof
Area Served	Gym	Gym	E-Wing
Manufacturer	AAON	AAON	Trane
Model #	RN-031-3-0-EA09-000	RN-030-3-0-E809-000	TCD048C40ABC
Serial #	201106:BNCU03832	201106:BNCT03830	L10102434D
Cooling Type	DX, R-410A	DX, R-410A	DX, R-22
Cooling Capacity (Tons)	31 Tons	30 Tons	4 Tons
Cooling Efficiency (SEER/EER)	11 EER	11 EER	-
Heating Type	HW	HW	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	2	2	14
ASHRAE Service Life	15	15	15
Remaining Life	13	13	1
Comments	Re-heat coil/Energy Recov	Re-heat coil/Energy Recov	

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **AC Units**

Tag	RTU-E4,E5,E7,E8	RTU-E6	ACCU-3
Unit Type	Rooftop Unit	Rooftop Unit	Split System AC
Qty	4	1	1
Location	E-Wing Roof	E-Wing Roof	Central Roof
Area Served	E-Wing	E-Wing	-
Manufacturer	Trane	Trane	Lennox
Model #	TCD075C40ABC	TCD060C40ABC	XC13-024-230-04
Serial #	L19104792D	L10102435D	5811F02587
Cooling Type	DX, R-22	DX, R-22	DX, R-410A
Cooling Capacity (Tons)	6.5 Tons	5 Tons	2 Tons
Cooling Efficiency (SEER/EER)	-	-	-
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	14	14	1
ASHRAE Service Life	15	15	15
Remaining Life	1	1	14
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **AC Units**

Т			
Tag			
Unit Type	Split System AC	Split System AC	Split System AC
Qty	2	1	1
Location	Central Roof	Central Roof	Central Roof
Area Served	-	-	-
Manufacturer	Trane	Fujitsu	Trane
Model #	TTA180B400CB	A0U36C4	TCD102C40AAA
Serial #	-	EBN 001779	49104945D
Cooling Type	DX, R-22	DX, R-410A	DX, R-22
Cooling Capacity (Tons)	15 Ton	3 Tons	8.5 Tons
Cooling Efficiency (SEER/EER)	9.5 EER	-	-
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	14	14	14
ASHRAE Service Life	15	15	15
Remaining Life	1	1	1
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.
"-" = Info Not Available

# **AC Units**

Tag			
Unit Type	Rooftop Unit	Split System AC	Split System Unit
Qty	1	1	1
Location	Central Roof	Central Roof	Central Roof
Area Served	-	-	-
Manufacturer	Trane Intellipak	Armstrong	York
Model #	SAHFC5040GC5048D 1E01	LSA090C-1G	H2CE120A46E
Serial #	J96E71308	5698K 08605	(S) NELM045597
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	50 Tons	7.5 Tons	10 Tons
Cooling Efficiency (SEER/EER)	-	-	9 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	14	12	14
ASHRAE Service Life	15	15	15
Remaining Life	1	3	1
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.
"-" = Info Not Available

# **AC Units**

Tag	ACCU-1,2		
Unit Type	Split System AC	Rooftop Unit	Rooftop Unit
Qty	2	2	1
Location	F Wing Roof	F Wing Roof	F Wing Roof
Area Served	-	-	-
Manufacturer	Lennox	York/Luxaire	York/Luxaire
Model #	TSA048H4N42Y	DBHB-W060AB	DBHB-W048AA
Serial #	5811C06929	HKWM459520	NLWM519096
Cooling Type	DX, R-410A	DX, R-22	DX, R-22
Cooling Capacity (Tons)	4 Tons	5 Tons	4 Tons
Cooling Efficiency (SEER/EER)	-	-	-
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	1	14	14
ASHRAE Service Life	15	15	15
Remaining Life	14	1	1
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.
"-" = Info Not Available

# **AC Units**

Tag	RTU-1	RTU-3,4	
Unit Type	Rooftop Unit	Rooftop Unit	Rooftop Unit
Qty	1	2	1
Location	F Wing Roof	Gym Roof	Gym Roof
Area Served	-	-	-
Manufacturer	Lennox	Lennox	Trane
Model #	LCH120H4BN2G	LCH06054TW1G	TCD210C40AAA
Serial #	5611F02533	5611F03272	L19104949D
Cooling Type	DX, R-410A	DX, R-410A	DX, R-22
Cooling Capacity (Tons)	10 Tons	5 Tons	17.5 Tons
Cooling Efficiency (SEER/EER)	12.2 EER	12.5 EER	-
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	1	1	14
ASHRAE Service Life	15	15	15
Remaining Life	14	14	1
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **Concord Engineering Group**

#### **Montgomery Township - Upper Montgomery Middle School**

# **Boilers**

Tag	B-1,2,3,4	 
Unit Type	Condensing Boilers	
Qty	4	
Location	Boiler Room	
Area Served	Unit Vents	
Manufacturer	Aerco	
Model #	Benchmarck 2.0	
Serial #	-	
Input Capacity (Btu/Hr)	2,000 MBH	
Rated Output Capacity (Btu/Hr)	1,706-1,860 MBH	
Approx. Efficiency %	88.0%	
Fuel	Nat Gas	
Approx Age	2	
ASHRAE Service Life	24	
Remaining Life	22	
Comments		

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **Concord Engineering Group**

#### **Montgomery Township - Upper Montgomery Middle School**

# **Cooling Tower**

edding rower			
Tag			
Unit Type	Air Cooled Chiller	Air Cooled Chiller	
Qty	1	1	
Location	2nd Floor B Wing Roof	2nd Floor B Wing Roof	
Area Served	Chilled Water Loop	Chilled Water Loop	
Manufacturer	Trane R-Series	McQuay	
Model #	R-Series (RTAA)	AGZ080CHHVG- ER10	
Serial #	-	STN0110600202	
Refrigerant	HCFC-22	R-410A	
Cooling Capacity (Tons)	80 Tons	80 Tons	
Cooling Efficiency (KW/Ton)	(Est) 1.17 KW/Ton	1.28 KW/Ton	
Volts / Phase / Hz	-	460/3/60	
Fuel	HCFC-22	R-410A	
Chilled Water GPM / AT	-	160 GPM / 12°ΔT	
Condenser	-	2 HP Fan	
Approx Age	20	1	
ASHRAE Service Life	20	20	
Remaining Life	0	19	-
Comments		30% Glycol solution	

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **Concord Engineering Group**

#### **Montgomery Township - Upper Montgomery Middle School**

# **Domestic Water Heaters**

Donicstic Water frea		 
Tag		
Unit Type	Domestic Hot Water	
Qty	1	
Location	Boiler Room	
Area Served	Upper MS	
Manufacturer	AO Smith Cyclone XI	
Model #	BTH 400A 100	
Serial #	0809M000535	
Size (Gallons)	130 Gallons	
Input Capacity (MBH/KW)	399.9 MBH	
Recovery (Gal/Hr)	465.33 GPH	
Efficiency %	80%	
Fuel	Nat Gas	
Approx Age	4	
ASHRAE Service Life	12	
Remaining Life	8	 
Comments		
l	•	

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

# **Concord Engineering Group**

# **Montgomery Township - Upper Montgomery Middle School**

# **Pumps**

Tag	P-1,2	P-3,4	
	Base Mounted End	Base Mounted End	
Unit Type	Suction	Suction	
Qty	2	2	
Location	Boiler Room	Boiler Room	
Area Served	HW Loop	HW Loop	
Manufacturer	Taco	Taco	
Model #	FI	FI	
Serial #	-	-	
Horse Power	2 HP	10 HP	
Flow	108 GPM @ 36 FTHD	410 GPM @ 66 FTHD	
Motor Info	Baldor Standard E	Baldor Standard E	
Electrical Power	208-230/460/3/60	208-230/460/3/60	
RPM	1750 RPM	1750 RPM	
Motor Efficiency %	84.0%	89.5%	
Approx Age	10	10	
ASHRAE Service Life	20	20	20
Remaining Life	10	16	17
Comments			

<sup>&</sup>quot;N/A" = Not Applicable.

<sup>&</sup>quot;-" = Info Not Available

Appendix Energy Audit APPENDIX E Concord Engineering Group, Inc.

CEG Job #: 9C11058
Project: Montgomery TWP. LGEA

Upper Montgomery Middle School

KWH COST: \$0.153

Bldg. Sq. Ft.

	&2: Lighting l	Upgra	ide - (	Gene	ral & Gym					PROPOSED LIGHTING									GAYDYGG			
	LIGHTING				,			r	T					1	r		r ·		SAVING			
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Туре	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.11	Classroom B215	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B214	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B213	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B212	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 208	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.31	806.0	\$123.32	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	\$99.45	\$14.00	\$70.00	0.06	156	\$23.87	2.93
221.11	Classroom B 209	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 210	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 211	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Conf. Room B 209A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	7th Grade Guidance	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	B 215A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Classroom B 201	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 202	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93

	&2: Lignung	g Upgrade - General & Gym								PROPOSED LIGHTING									SAVINGS			
CEG	Fixture	Yearly	No.	No	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	No. Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.11	Classroom B 203	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 204	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 205	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 206	2600	12	2	T8, Elect. Ballast, Surface	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 207	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Conf. Room - Sp Ed	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Office - Pankowski	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Office B204A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	B 213A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
227.21	Office by Elev. Mech. Rm.	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$155.14	6	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.29	764.4	\$116.95	\$24.00	\$144.00	0.10	249.6	\$38.19	3.77
222.21	Corridor B200	3000	22	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.36	4,092.0	\$626.08	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	3300	\$504.90	\$14.00	\$308.00	0.26	792	\$121.18	2.54
221.34	Classroom F101	2600	40	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	2.48	6,448.0	\$986.54	40	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.00	5200	\$795.60	\$14.00	\$560.00	0.48	1248	\$190.94	2.93
221.34	Classroom F102	2600	40	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	2.48	6,448.0	\$986.54	40	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.00	5200	\$795.60	\$14.00	\$560.00	0.48	1248	\$190.94	2.93
221.11	Classroom F103	2600	21	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.30	3,385.2	\$517.94	21	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.05	2730	\$417.69	\$14.00	\$294.00	0.25	655.2	\$100.25	2.93
221.11	Classroom F104	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.24	3,224.0	\$493.27	20	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.00	2600	\$397.80	\$14.00	\$280.00	0.24	624	\$95.47	2.93
221.11	Classroom F105	2600	26	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.61	4,191.2	\$641.25	26	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.30	3380	\$517.14	\$14.00	\$364.00	0.31	811.2	\$124.11	2.93

	&2: Lighting				•					PROI	POSED	LIGHTING							SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Туре	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.34	Receiving	3000	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.25	744.0	\$113.83	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	600	\$91.80	\$14.00	\$56.00	0.05	144	\$22.03	2.54
612	-	3000	2	1	Pendant Mnt., 100w A19 Lamp	100	0.20	600.0	\$91.80	2	1	(1) 26w CFL Lamp	26	0.05	156	\$23.87	\$20.00	\$40.00	0.15	444	\$67.93	0.59
242.21	Café	2600	30	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	3.27	8,502.0	\$1,300.81	30	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	3.00	7800	\$1,193.40	\$28.00	\$840.00	0.27	702	\$107.41	7.82
221.11	Boy's Locker Room	2600	35	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.17	5,642.0	\$863.23	35	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.75	4550	\$696.15	\$14.00	\$490.00	0.42	1092	\$167.08	2.93
221.11	Girl's Locker Room	2600	35	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.17	5,642.0	\$863.23	35	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.75	4550	\$696.15	\$14.00	\$490.00	0.42	1092	\$167.08	2.93
221.11	Men's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	\$59.67	\$14.00	\$42.00	0.04	93.6	\$14.32	2.93
221.11	Women's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	\$59.67	\$14.00	\$42.00	0.04	93.6	\$14.32	2.93
769	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19,344.0	\$2,959.63	16	6	2x4 54w T5HO 6 Lamp w/Prismatic Lens	354	5.66	14726.4	\$2,253.14	\$350.00	\$5,600.00	1.78	4617.6	\$706.49	7.93
769	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9,672.0	\$1,479.82	8	6	2x4 54w T5HO 6 Lamp w/Prismatic Lens	354	2.83	7363.2	\$1,126.57	\$350.00	\$2,800.00	0.89	2308.8	\$353.25	7.93
232.21	Classroom E 101	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	101 Prep	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	\$114.57	\$21.00	\$84.00	0.06	145.6	\$22.28	3.77
232.21	Classroom E 102	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	Classroom E 103	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	Classroom E 104	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	104 Prep	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	\$114.57	\$21.00	\$84.00	0.06	145.6	\$22.28	3.77
232.21	Classroom E 105	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	Classroom E 106	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77
232.21	Prep 105	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	\$114.57	\$21.00	\$84.00	0.06	145.6	\$22.28	3.77
232.21	Classroom E 107	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3,801.2	\$581.58	17	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.22	3182.4	\$486.91	\$21.00	\$357.00	0.24	618.8	\$94.68	3.77

	&2: Lighting	Opgra	iue - v	Gene	rai & Gyin					PPOT	OCED	LIGHTING	1						SAVING	c		1
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
232.21	Classroom E 108	2600	20	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.72	4,472.0	\$684.22	20	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.44	3744	\$572.83	\$21.00	\$420.00	0.28	728	\$111.38	3.77
232.21	Prep 108	2600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1,118.0	\$171.05	5	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.36	936	\$143.21	\$21.00	\$105.00	0.07	182	\$27.85	3.77
221.11	Men's Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$49.33	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$39.78	\$14.00	\$28.00	0.02	62.4	\$9.55	2.93
221.11	Women's Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$49.33	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$39.78	\$14.00	\$28.00	0.02	62.4	\$9.55	2.93
221.11	Classroom C 102	2600	21	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.30	3,385.2	\$517.94	21	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.05	2730	\$417.69	\$14.00	\$294.00	0.25	655.2	\$100.25	2.93
242.21	Classroom C 101	2600	4	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	0.44	1,133.6	\$173.44	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	0.40	1040	\$159.12	\$28.00	\$112.00	0.04	93.6	\$14.32	7.82
237.22		2600	88	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	92	8.10	21,049.6	\$3,220.59	88	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.33	Media Center	2600	78	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	62	4.84	12,573.6	\$1,923.76	78	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	3.90	10140	\$1,551.42	\$14.00	\$1,092.00	0.94	2433.6	\$372.34	2.93
650		2600	12	2	Wall Sconce, (2) 26w PL Quad Lamp	54	0.65	1,684.8	\$257.77	12	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
211.14	Cove Lighting	2600	44	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., No Lens	33	1.45	3,775.2	\$577.61	44	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	1.10	2860	\$437.58	\$7.00	\$308.00	0.35	915.2	\$140.03	2.20
222.22	BSI	2600	8	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	62	0.50	1,289.6	\$197.31	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$159.12	\$14.00	\$112.00	0.10	249.6	\$38.19	2.93
222.22	BSI	2600	7	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	62	0.43	1,128.4	\$172.65	7	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.35	910	\$139.23	\$14.00	\$98.00	0.08	218.4	\$33.42	2.93
624	Auditorium	2600	44	1	Recessed Auditorium Light, 300w A Lamp Incandescent	300	13.20	34,320.0	\$5,250.96	44	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
613.1	Stage	1800	12	1	Industrial Fixture, 300w A19 Lamp	300	3.60	6,480.0	\$991.44	12	2	2 Lamp, 28w FO28/841/SS/ECO T8, Dimming Ballast, Pendant Mount, No Lens	50	0.60	1080	\$165.24	\$220.00	\$2,640.00	3.00	5400	\$826.20	3.20
558	Classroom C 104	2600	13	1	Recessed Down Light, 100w R30 Lamp, Fresnel Lens	100	1.30	3,380.0	\$517.14	13	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.34	878.8	\$134.46	\$20.00	\$260.00	0.96	2501.2	\$382.68	0.68
221.11	Speech	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Office	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93

	&2: Lighting GLIGHTING	Pgre			an a ojin					PROF	POSED	LIGHTING	1						SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
211.11	Classroom C 103	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	30	0.54	1,404.0	\$214.81	18	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.45	1170	\$179.01	\$7.00	\$126.00	0.09	234	\$35.80	3.52
221.11	Classroom B 103	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 104	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 105	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 106	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 107	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 108	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 109	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 110	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 111	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Men's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	\$59.67	\$14.00	\$42.00	0.04	93.6	\$14.32	2.93
221.11	Women's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	\$59.67	\$14.00	\$42.00	0.04	93.6	\$14.32	2.93
221.11	Classroom B 104A	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	\$147.98	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	\$119.34	\$14.00	\$84.00	0.07	187.2	\$28.64	2.93
221.21	Stairways (3)	3000	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	2,232.0	\$341.50	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1800	\$275.40	\$14.00	\$168.00	0.14	432	\$66.10	2.54
227.21	Classroom B 108A	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$155.14	6	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.29	764.4	\$116.95	\$24.00	\$144.00	0.10	249.6	\$38.19	3.77

	&2: Lighting	Upgra	iae - v	Gene	rai & Gyiii					nr o-		Y YOMENNO	1									
	G LIGHTING	X/ l.	M.	N.	F:t	Tri	T-4-1	1.3371.737	VI-	_		LIGHTING Dates Halit	XX7-44	T-4-1	1-3371-737	VI	II-i-C	T-4-1	SAVING		Vl	Vacada Ciar 1
CEG	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
Type 242.22	Classroom B 112	2600	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	2.62	6,801.6	\$1,040.64	24	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	2.40	6240	\$954.72	\$28.00	\$672.00	Savings 0.22	561.6	\$ Savings \$85.92	7.82
242.22	Classroom B 114	2600	30	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	3.27	8,502.0	\$1,300.81	30	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	3.00	7800	\$1,193.40	\$28.00	\$840.00	0.27	702	\$107.41	7.82
242.22	Classroom B 115	2600	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	2.62	6,801.6	\$1,040.64	24	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	2.40	6240	\$954.72	\$28.00	\$672.00	0.22	561.6	\$85.92	7.82
222.11	Faculty Dining	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Robotics	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 101	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Classroom B 102	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Reading Room B 116	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	\$147.98	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	\$119.34	\$14.00	\$84.00	0.07	187.2	\$28.64	2.93
221.11	Nurse	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.50	1,289.6	\$197.31	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$159.12	\$14.00	\$112.00	0.10	249.6	\$38.19	2.93
221.11	8th Guidance	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Conf. Room	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$79.56	\$14.00	\$56.00	0.05	124.8	\$19.09	2.93
221.11	Copy Room	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,934.4	\$295.96	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$238.68	\$14.00	\$168.00	0.14	374.4	\$57.28	2.93
221.11	Main Office	2600	9	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.56	1,450.8	\$221.97	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	1170	\$179.01	\$14.00	\$126.00	0.11	280.8	\$42.96	2.93
242.21	Side Offices (8)	2600	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	1.96	5,101.2	\$780.48	18	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	1.80	4680	\$716.04	\$28.00	\$504.00	0.16	421.2	\$64.44	7.82
221.21	Corridor B 100	3000	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.74	5,208.0	\$796.82	28	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.40	4200	\$642.60	\$14.00	\$392.00	0.34	1008	\$154.22	2.54

EXISTING	GLIGHTING									PROI	POSED	LIGHTING							SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.21	Corridor C 101	3000	44	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.73	8,184.0	\$1,252.15	44	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.20	6600	\$1,009.80	\$14.00	\$616.00	0.53	1584	\$242.35	2.54
221.21		3000	36	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.23	6,696.0	\$1,024.49	36	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.80	5400	\$826.20	\$14.00	\$504.00	0.43	1296	\$198.29	2.54
242.21	Corridor E/F 100	3000	15	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	1.64	4,905.0	\$750.47	15	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	100	1.50	4500	\$688.50	\$28.00	\$420.00	0.14	405	\$61.97	6.78
237.22		3000	8	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	92	0.74	2,208.0	\$337.82	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.03	280.3	\$42.89	2	1	LED Exit Sign	2	0.00	35.04	\$5.36	\$95.00	\$190.00	0.03	245.28	\$37.53	5.06
725	Exterior	4000	16	1	150w HPS Wallpack	188	3.01	12,032.0	\$1,840.90	16	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		1,495	221				343,426	\$52,544	1,495	221	·	1	82.3	217,091	\$33,215		\$32,174	21.7	55,040	\$8,421	3.82

CEG Job #: 9C11058
Project: Montgomery TWP. LGEA
Address: 0

Upper Montgomery Middle School

KWH COST: \$0.153

#### **ECM 3: Lighting Controls**

Building SF:

EXISTIN	G LIGHTING									PROPO	SED L	GHTING CONTROLS								SAVINGS	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Cont.	Description	Used	kW	(%)	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.11	Classroom B215	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B214	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B213	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B212	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 208	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.31	806	\$123.32	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.25	20%	644.8	\$98.65	\$150.00	\$150.00	0.06	161.2	\$24.66	6.08
221.11	Classroom B 209	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 210	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 211	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Conf. Room B 209A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	7th Grade Guidance	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	B 215A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Classroom B 201	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 202	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 203	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 204	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07

EXISTIN	G LIGHTING									PROP	OSED L	GHTING CONTROLS								SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Cont.	Description	Used	kW	(%)	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.11	Classroom B 205	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 206	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 207	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Conf. Room - Sp Ed	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Office - Pankowski	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Office B204A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	B 213A	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
227.21	Office by Elev. Mech. Rm.	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$155.14	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$124.11	\$150.00	\$150.00	0.08	202.8	\$31.03	4.83
222.21	Corridor B200	3000	22	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.36	4092	\$626.08	22	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	1.09	20%	3273.6	\$500.86	\$300.00	\$300.00	0.27	818.4	\$125.22	2.40
221.34	Classroom F101	2600	40	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	, 62	2.48	6448	\$986.54	40	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.98	20%	5158.4	\$789.24	\$450.00	\$450.00	0.50	1289.6	\$197.31	2.28
221.34	Classroom F102	2600	40	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	., 62	2.48	6448	\$986.54	40	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.98	20%	5158.4	\$789.24	\$450.00	\$450.00	0.50	1289.6	\$197.31	2.28
221.11	Classroom F103	2600	21	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.30	3385.2	\$517.94	21	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.04	20%	2708.16	\$414.35	\$450.00	\$450.00	0.26	677.04	\$103.59	4.34
221.11	Classroom F104	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.24	3224	\$493.27	20	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	0.99	20%	2579.2	\$394.62	\$450.00	\$450.00	0.25	644.8	\$98.65	4.56
221.11	Classroom F105	2600	26	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.61	4191.2	\$641.25	26	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.29	20%	3352.96	\$513.00	\$450.00	\$450.00	0.32	838.24	\$128.25	3.51
221.34	D	3000	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	, 62	0.25	744	\$113.83	4		Dual Technology Occupancy	62	0.20	20%	595.2	\$91.07	\$200.00	\$200.00	0.05	148.8	\$22.77	7.20
612	Receiving	3000	2	1	Pendant Mnt., 100w A19 Lamp	100	0.20	600	\$91.80	2	- 1	Sensor - Remote Mnt.	100	0.16	20%	480	\$73.44	\$300.00	\$300.00	0.04	120	\$18.36	7.29

EXISTIN	NG LIGHTING									PROPO	SED L	IGHTING CONTROLS								SAVING			
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
242.21	Location Café	Usage 2600	Fixts 30	Lamps 4	Type  2x4, 4 Lamp, 32w 700  Series T8, Elect. Ballast, Recessed Mnt., Prismatic  Lens	Watts	3.27	Fixtures 8502	\$ Cost \$1,300.81	Fixts 30	Cont.	Description  Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	Used 109	kW 2.62	20%	Fixtures 6801.6	\$ Cost \$1,040.64	(INSTALLED) \$450.00	Cost \$450.00	Savings 0.65	Savings 1700.4	\$ Savings \$260.16	Payback 1.73
221.11	Boy's Locker Room	2600	35	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.17	5642	\$863.23	35	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.74	20%	4513.6	\$690.58	\$450.00	\$450.00	0.43	1128.4	\$172.65	2.61
221.11	Girl's Locker Room	2600	35	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.17	5642	\$863.23	35	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.74	20%	4513.6	\$690.58	\$450.00	\$450.00	0.43	1128.4	\$172.65	2.61
221.11	Men's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.15	20%	386.88	\$59.19	\$150.00	\$150.00	0.04	96.72	\$14.80	10.14
221.11	Women's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.15	20%	386.88	\$59.19	\$150.00	\$150.00	0.04	96.72	\$14.80	10.14
769	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19344	\$2,959.63	16	3	Dual Technology Occupancy Sensor - Remote Mnt.	465	5.95	20%	15475.2	\$2,367.71	\$300.00	\$900.00	1.49	3868.8	\$591.93	1.52
769	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9672	\$1,479.82	8	2	Dual Technology Occupancy Sensor - Remote Mnt.	465	2.98	20%	7737.6	\$1,183.85	\$300.00	\$600.00	0.74	1934.4	\$295.96	2.03
232.21	Classroom E 101	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	101 Prep	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	86	0.28	20%	715.52	\$109.47	\$150.00	\$150.00	0.07	178.88	\$27.37	5.48
232.21	Classroom E 102	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	Classroom E 103	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	Classroom E 104	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	104 Prep	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	86	0.28	20%	715.52	\$109.47	\$150.00	\$150.00	0.07	178.88	\$27.37	5.48
232.21	Classroom E 105	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	Classroom E 106	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	Prep 105	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	\$136.84	4	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	0.28	20%	715.52	\$109.47	\$450.00	\$450.00	0.07	178.88	\$27.37	16.44

EXISTIN	G LIGHTING									PROPO	SED L	GHTING CONTROLS								SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Cont.	Description	Used	kW	(%)	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
232.21	Classroom E 107	2600	17	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.46	3801.2	\$581.58	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.17	20%	3040.96	\$465.27	\$450.00	\$450.00	0.29	760.24	\$116.32	3.87
232.21	Classroom E 108	2600	20	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.72	4472	\$684.22	20	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	86	1.38	20%	3577.6	\$547.37	\$450.00	\$450.00	0.34	894.4	\$136.84	3.29
232.21	Prep 108	2600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1118	\$171.05	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	86	0.34	20%	894.4	\$136.84	\$150.00	\$150.00	0.09	223.6	\$34.21	4.38
221.11	Men's Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$49.33	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.10	20%	257.92	\$39.46	\$150.00	\$150.00	0.02	64.48	\$9.87	15.20
221.11	Women's Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	\$49.33	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.10	20%	257.92	\$39.46	\$150.00	\$150.00	0.02	64.48	\$9.87	15.20
221.11	Classroom C 102	2600	21	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.30	3385.2	\$517.94	21	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	1.04	20%	2708.16	\$414.35	\$450.00	\$450.00	0.26	677.04	\$103.59	4.34
242.21	Classroom C 101	2600	4	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	0.44	1133.6	\$173.44	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	109	0.35	20%	906.88	\$138.75	\$150.00	\$150.00	0.09	226.72	\$34.69	4.32
237.22		2600	88	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	92	8.10	21049.6	\$3,220.59	88	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	92	6.48	20%	16839.68	\$2,576.47	\$450.00	\$900.00	1.62	4209.92	\$644.12	1.40
221.33	Media Center	2600	78	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	62	4.84	12573.6	\$1,923.76	78	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	62	3.87	20%	10058.88	\$1,539.01	\$450.00	\$900.00	0.97	2514.72	\$384.75	2.34
650		2600	12	2	Wall Sconce, (2) 26w PL Quad Lamp	54	0.65	1684.8	\$257.77	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	54	0.52	20%	1347.84	\$206.22	\$300.00	\$300.00	0.13	336.96	\$51.55	5.82
211.14	Cove Lighting	2600	44	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., No Lens	33	1.45	3775.2	\$577.61	44	1	Dual Technology Occupancy Sensor - Remote Mnt.	33	1.16	20%	3020.16	\$462.08	\$300.00	\$300.00	0.29	755.04	\$115.52	2.60
222.22	BSI	2600	8	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	62	0.50	1289.6	\$197.31	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.40	20%	1031.68	\$157.85	\$300.00	\$300.00	0.10	257.92	\$39.46	7.60
222.22	BSI	2600	7	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	62	0.43	1128.4	\$172.65	7	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.35	20%	902.72	\$138.12	\$300.00	\$300.00	0.09	225.68	\$34.53	8.69
624	Auditorium	2600	44	1	Recessed Auditorium Light, 300w A Lamp Incandescent		13.20	34320	\$5,250.96	44	0	No Change	300	13.20	0%	34320	\$5,250.96	\$0.00	\$0.00	0.00	0	\$0.00	0.00
613.1	Stage	1800	12	1	Industrial Fixture, 300w A19 Lamp	300	3.60	6480	\$991.44	12	0	No Change	300	3.60	0%	6480	\$991.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
558	Classroom C 104	2600	13	1	Recessed Down Light, 100w R30 Lamp, Fresnel Lens	100	1.30	3380	\$517.14	13	1	Dual Technology Occupancy Sensor - Remote Mnt.	100	1.04	20%	2704	\$413.71	\$300.00	\$300.00	0.26	676	\$103.43	2.90

	G LIGHTING						,					IGHTING CONTROLS			·					SAVING			
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
221.11	Location Speech	Usage 2600	Fixts 4	Lamps 2	Type  1x4, 2 Lamp, 32w 700  Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	Watts 62	0.25	Fixtures 644.8	\$ Cost \$98.65	Fixts 4	Cont.	Description  Dual Technology Occupancy Sensor - Switch Mnt.	Used 62	0.20	20%	Fixtures 515.84	\$ Cost \$78.92	(INSTALLED) \$150.00	\$150.00	Savings 0.05	Savings 128.96	\$ Savings \$19.73	Payback 7.60
221.11	Office	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
211.11	Classroom C 103	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic	30	0.54	1404	\$214.81	18	1	Dual Technology Occupancy Sensor - Remote Mnt.	30	0.43	20%	1123.2	\$171.85	\$300.00	\$300.00	0.11	280.8	\$42.96	6.98
221.11	Classroom B 103	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 104	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 105	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 106	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 107	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 108	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 109	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 110	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 111	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Men's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.15	20%	386.88	\$59.19	\$150.00	\$150.00	0.04	96.72	\$14.80	10.14
221.11	Women's Room	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	\$73.99	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.15	20%	386.88	\$59.19	\$150.00	\$150.00	0.04	96.72	\$14.80	10.14
221.11	Classroom B 104A	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	\$147.98	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.30	20%	773.76	\$118.39	\$150.00	\$150.00	0.07	193.44	\$29.60	5.07
221.21	Stairways (3)	3000	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	2232	\$341.50	12	0	No Change	62	0.74	0%	2232	\$341.50	\$0.00	\$0.00	0.00	0	\$0.00	0.00

### **ECM 3: Lighting Controls**

	G LIGHTING											IGHTING CONTROLS								SAVING			
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type 2x2, 2 Lamp, 32w 700	Watts	kW	Fixtures	\$ Cost	Fixts	Cont.	Description	Used	kW	(%)	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
227.21	Classroom B 108A	2600	6	2	series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$155.14	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$124.11	\$150.00	\$150.00	0.08	202.8	\$31.03	4.83
242.22	Classroom B 112	2600	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	2.62	6801.6	\$1,040.64	24	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	109	2.09	20%	5441.28	\$832.52	\$450.00	\$450.00	0.52	1360.32	\$208.13	2.16
242.22	Classroom B 114	2600	30	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	3.27	8502	\$1,300.81	30	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	109	2.62	20%	6801.6	\$1,040.64	\$450.00	\$450.00	0.65	1700.4	\$260.16	1.73
242.22	Classroom B 115	2600	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	109	2.62	6801.6	\$1,040.64	24	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack Remote Mnt.	109	2.09	20%	5441.28	\$832.52	\$450.00	\$450.00	0.52	1360.32	\$208.13	2.16
222.11	Faculty Dining	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Robotics	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 101	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Classroom B 102	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Reading Room B	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	\$147.98	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.30	20%	773.76	\$118.39	\$150.00	\$150.00	0.07	193.44	\$29.60	5.07
221.11	Nurse	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.50	1289.6	\$197.31	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.40	20%	1031.68	\$157.85	\$150.00	\$150.00	0.10	257.92	\$39.46	3.80
221.11	8th Guidance	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Conf. Room	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	\$98.65	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$78.92	\$150.00	\$150.00	0.05	128.96	\$19.73	7.60
221.11	Copy Room	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1934.4	\$295.96	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.60	20%	1547.52	\$236.77	\$300.00	\$300.00	0.15	386.88	\$59.19	5.07
221.11	Main Office	2600	9	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.56	1450.8	\$221.97	9	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	20%	1160.64	\$177.58	\$300.00	\$300.00	0.11	290.16	\$44.39	6.76
242.21	Side Offices (8)	2600	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	1.96	5101.2	\$780.48	18	0	No Change	109	1.96	0%	5101.2	\$780.48	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.21	Corridor B 100	3000	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.74	5208	\$796.82	28	2	Dual Technology Occupancy Sensor - Remote Mnt.	62	1.39	20%	4166.4	\$637.46	\$300.00	\$600.00	0.35	1041.6	\$159.36	3.76

**ECM 3: Lighting Controls** 

EXISTIN	G LIGHTING									PROPO	SED LI	GHTING CONTROLS								SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Controls	Watts	Total	Reduction	kWh/Yr	Yearly	Unit Cost	Total	kW	kWh/Yr	Yearly	Yearly Simple
Type	Location	Usage	Fixts	Lamps	Type	Watts	kW	Fixtures	\$ Cost	Fixts	Cont.	Description	Used	kW	(%)	Fixtures	\$ Cost	(INSTALLED)	Cost	Savings	Savings	\$ Savings	Payback
221.21	Corridor C 101	3000	44	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.73	8184	\$1,252.15	44	3	Dual Technology Occupancy Sensor - Remote Mnt.	62	2.18	20%	6547.2	\$1,001.72	\$300.00	\$900.00	0.55	1636.8	\$250.43	3.59
221.21		3000	36	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.23	6696	\$1,024.49	36	2	Dual Technology Occupancy Sensor - Remote Mnt.	62	1.79	20%	5356.8	\$819.59	\$300.00	\$600.00	0.45	1339.2	\$204.90	2.93
242.21	Corridor E/F 100	3000	15	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	109	1.64	4905	\$750.47	15	1	Dual Technology Occupancy Sensor - Remote Mnt.	109	1.31	20%	3924	\$600.37	\$300.00	\$300.00	0.33	981	\$150.09	2.00
237.22	Collidol E/F 100	3000	8	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	92	0.74	2208	\$337.82	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	92	0.59	20%	1766.4	\$270.26	\$300.00	\$300.00	0.15	441.6	\$67.56	4.44
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.03	280.32	\$42.89	2	0	No Change	16	0.03	0%	280.32	\$42.89	\$0.00	\$0.00	0.00	0	\$0.00	0.00
725	Exterior	4000	16	1	150w HPS Wallpack	188	3.01	12032	\$1,840.90	16	0	No Change	188	3.01	0%	12032	\$1,840.90	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		1,495	221			129.7	343,426.1	\$52,544	1,495	103			108.3		286,830.0	\$43,884.99		\$30,450	21.43	56,596	\$8,659	3.52

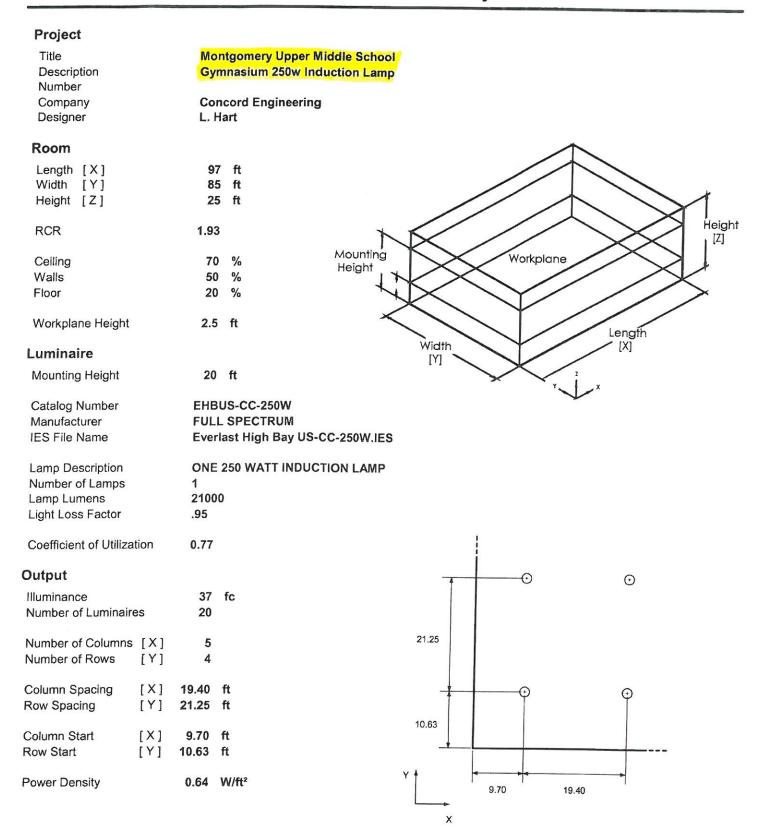
# **Investment Grade Lighting Audit**

Montgomery Upper Middle School

KWH COST: \$0.120

ECM ##: Lighting Upgrade - Comparison

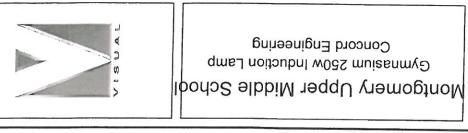
EXISTIN	G LIGHTING						***************************************			PRO	POSED	LIGHTING								SAVING	S		
CEG	Fixture	Yearly	No.	No.	Fixture	Fixt	Total	kWh/Yr	Yearly	No.	No.	Retro-Unit	Watts	Total	kWh/Yr	Yearly	Unit Cost	Total	Total Incentive	kW	kWh/Yr		Yearly Simple
Туре	Location	Usage	Fixts	Lamps	Туре	Watts	kW	Fixtures	\$ Cost	Fixts	Lamps	Description	Used	kW	Fixtures		(INSTALLED)	- N		Savings	Savings	\$ Savings	Payback
769	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19,344.0	\$2,321.28	16	6	2x4 54w T5HO 6 Lamp w/Prismatic Lens	354	5.66	14726.4	\$1,767.17	\$350.00	\$5,600.00	\$1,600.00	1.78	4617.6	\$554.11	7.22
769	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9,672.0	\$1,160.64	8	6	2x4 54w T5HO 6 Lamp w/Prismatic Lens	354	2.83	7363.2	\$883.58	\$350.00	\$2,800.00	\$800.00	0.89	2308.8	\$277.06	7.22
770	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19,344.0	\$2,321.28	20	1	250w induction lamp	262	5.24	13624	\$1,634.88	\$550.00	\$11,000.00	\$1,400.00	2.20	5720	\$686.40	13.99
770	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9,672.0	\$1,160.64	8	1	250w induction lamp	262	2.10	5449.6	\$653.95	\$550.00	\$4,400.00	\$560.00	1.62	4222.4	\$506.69	7.58
771	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19,344.0	\$2,321.28	24	8	42w cfl Sportlite or Equal	337	8.09	21028.8	\$2,523.46	\$910.00	\$21,840.00	\$0.00	-0.65	-1684.8	-\$202.18	-108.02
771	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9,672.0	\$1,160.64	8	8	42w cfl Sportlite or Equal	337	2.70	7009.6	\$841.15	\$910.00	\$7,280.00	\$0.00	1.02	2662.4	\$319.49	22.79
772	Gym	2600	16	1	400w MH, Clear Lens	465	7.44	19,344.0	\$2,321.28	20	1	4 pod LED	287	5.74	14924	\$1,790.88	\$1,660.00	\$33,200.00	\$3,000.00	1.70	4420	\$530.40	56.94
772	Aux Gym/Weight Room	2600	8	1	400w MH, Clear Lens	465	3.72	9,672.0	\$1,160.64	6	1	4 pod LED	287	1.72	4477.2	\$537.26	\$1,660.00	\$9,960.00	\$900.00	2.00	5194.8	\$623.38	14.53



STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Workplane	+	40.9 fc	47.8 fc	31.9 fc	1.5:1	1.3:1

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		Luillens LLF		21000		
	- Eile	2011		Everlast High	Bay US-CC-	טבטואו ודיס
	Lamp		ONE 250 WATT	INDUCTION I AMP		
	g Number Description		PREMIUM ACRYLIC	REFLECTOR WITH	CONICAL DROP LENS	
	Catalog Number		MOSC OU STRAILS	MOCZ-00-		
	Qty		20	24		
arit and	Label		I M-1			
	ymbol	(		)		

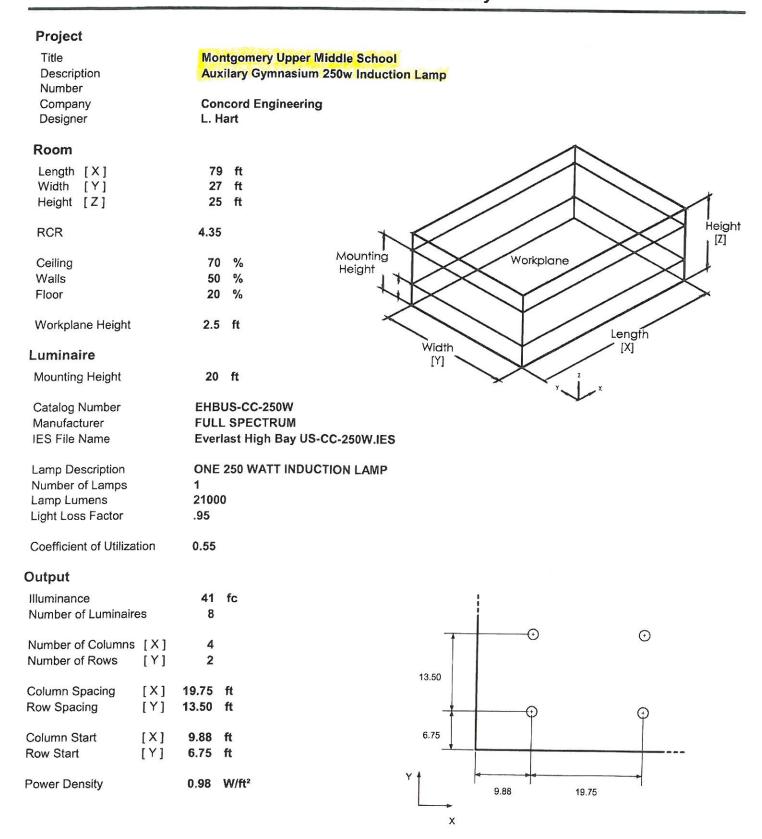


-							
<b>⊕</b> 9.1.9	39.9	<b>⊕</b> 35.5	+40.7	35.5	39.9	<b>⊕</b> 31.9	
41.4	38.7	45.8	<sup>+</sup> 39.7	45.8	38.7	41.4	
<b>9</b> 36.1	44.9	<b>0</b> 40.6	45.9	<b>4</b> 0.6	44.9	<b>⊕</b> 36.1	
<sup>+</sup> 43.2	40.7	47.8	41.7	47.8	40.7	+43.2	
36.8	45.6	041.4	<sup>+</sup> 46.7	<b>⊕</b> 41.4	45.6	36.8	
<sup>+</sup> 43.2	*40.7	47.8	41.7	47.8	40.7	43.2	
<b>⊕</b>	44.9	640.6	45.9	9.04	44.9	<b>⊕</b> 36.1	
+ 4.	<sup>+</sup> 38.7	45.8	<sup>+</sup> 39.7	45.8	38.7	41.4	
<b>Q</b> . 1.9	39.9	35.5	<sup>+</sup> 40.7	35.5	939.9	<b>9</b>	

Gymnasium 250w Induction Lamp Concord Engineering

Plan View Scale 1" = 20'

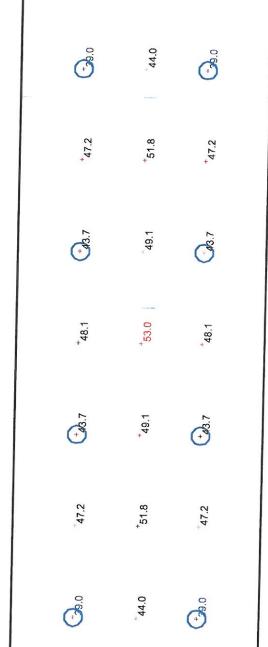
Designer L. Hart	<b>Date</b> Feb 20 2012	Scale	Drawing No.	1 of 1	
	ОЩ	S	0		



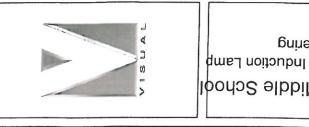
Symbol         Avg         Max         Min           +         45.6 fc         53.0 fc         39.0 fc
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		Watts	262	
		LF	0.95	
		Lumens LLF Watts	21000	
		rile	Everlast High 21000 0.95	Bay US-CC- 250W/JES
		dima	ONE 250 WATT INDUCTION LAMP	
	Number Description		PREMIUM ACRYLIC REFLECTOR WITH CONICAL PROBLEMS	CONTRACT LENS
INAIRE SCHEDULE	Label Qty Catalog Number		EHBUS-CC-250W	
SCH	Qty		∞	
VAIRE	Label		LM-1	-
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95.0	44.0	ઁ	
<sup>+</sup> 47.2	<sup>+</sup> 51.8	<sup>+</sup> 47.2	
<b>9</b>	49.1	\$ 7.5	
<sup>+</sup>	<sup>+</sup> 53.0	48.1	
+98.7	<sup>+</sup> 49.1	₹	
47.2	51.8	47.2	
000	44.0	Š	
	_	_	







Nontgomery Upper Middle School Auxilary Gymnasium 250w Induction Lamp Concord Engineering	Designer L. Hart	<b>Date</b> Feb 20 2012	Scale	Drawing No.	1 of 1	
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\*Patent Pending

# **Huron Acrylic High Bay**

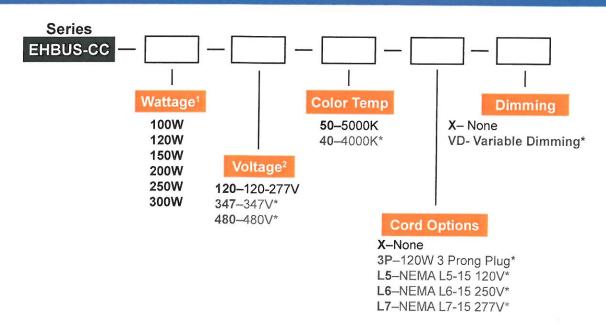
## Description

- Series: EHBUS-CC
- · Lamp Life Rating: 100,000 hours
- · Lumen Maintenance: 70% over 100,000 hours
- Light Output: 5000K, 82-90 CRI
- · IP Rating: IP43
- Applications: Warehouses, factories, retail showrooms, gymnasiums, supermarkets, exhibition halls
- · Warranty: 10 Year Limited

# **Specifications and Patent Pending Features**

- Premium grade acrylic reflector with <2% Haze</li>
- · Conical lens lifts main beam and breaks diffuses image
- · Stainless steel roll-form clamp band
- US Patented optics improve performance by 20% compared to competing fixtures
- Die cast aluminum ballast casing with corrosion-resistant white powder coat finish
- · Electronic ballast with high power factor, flicker free instant re-strike
- · Excellent vibration & shock resistance

# **Ordering Information**



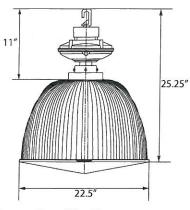
**Bold** = Standard Grey \* = Upgrade options available upon request

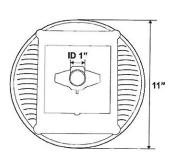
\*Legal Notice: Full Spectrum Solutions owns proprietary rights in the EverLast® Series of fixtures in the form of pending patent applications in the US and PCT applications for International protection.

Example: EHBUS-CC-150-120-50-3P-VD

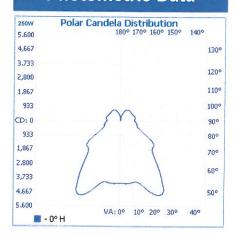


# **Dimensions**





# **Photometric Data**



## **Lamp Specifications**

Wattage	Lumens	L/W Ratio	CRI	CCT (KELVIN)	Rated Life
100W	8,400	84	82-85	5000	100,000 hours
120W	10,100	84	82-85	5000	100,000 hours
150W	12,600	84	82-85	5000	100,000 hours
200W	16,800	84	82-85	5000	100,000 hours
250W	21,000	84	86-90	5000	100,000 hours
300W	25,200	84	86-90	5000	100,000 hours

### **Ballast Specifications**

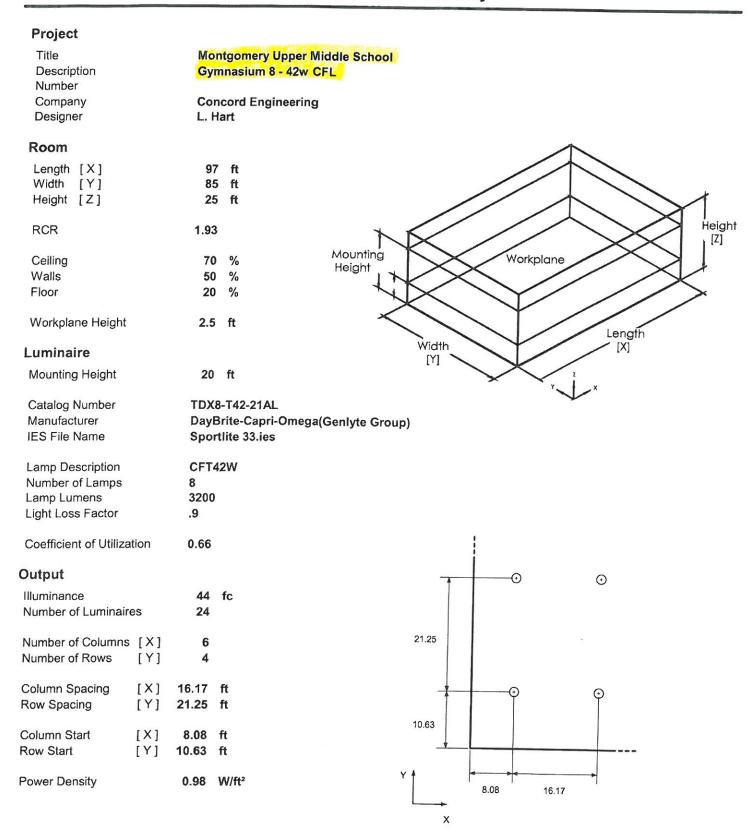
System Wattage	Input Voltage	Input Current	Input Freq.	Power Factor	Ambient Temp	THD
111W	120-277V/480V*	0.93-0.42A / 0.22A	50/60Hz	>0.95	-20 to 130 F°	<10%
134W	120-277V/480V*	1.05-0.46A / 0.28A	50/60Hz	>0.95	-20 to 130 F°	<10%
165W	120-277V/480V*	1.35-0.61A / 0.35A	50/60Hz	>0.95	-20 to 130 F°	<10%
215W	120-277V/480V*	1.77-0.80A / 0.45A	50/60Hz	>0.95	-20 to 130 F°	<10%
265W	120-277V/480V*	2.21-1.00A / 0.56A	50/60Hz	>0.95	-20 to 130 F°	<10%
320W	120-277V/480V*	2.65-1.20A / 0.62A	50/60Hz	>0.95	-20 to 130 F°	<10%

# **Application Image - EHBUS-CC**

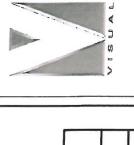


\*Legal Notice: Full Spectrum Solutions owns proprietary rights in the EverLast® Series of fixtures in the form of pending patent applications in the US and PCT applications for International protection.

EverLast® Lighting A Product of Full Spectrum Solutions, Inc. 2009, All Rights Reserved



STATISTICS						
Description	Symbol	Avg	Max	Min	Max/Min	Average
					III WAIII	AVG/MIII
Workplane		47.1 fc	57.5 fc	29.0 fc	2.0:1	7.50



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**Date** Feb 20 2012

Scale

**Designer** L. Hart

Drawing No.

1 of 1

View	1" = 20'
Plan	Scale

	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		loor	Jomery Upper Middle Sch Gymnasium 8 - 42w CFL Concord Engineering
	Watts	337		

0.30

3200

Sportlite 33.ies

CFT42W

SPORTLITE TDX COMPACT FLUORESCENT HIGHBAY W/21" ALUMINUM REFLECTOR

Lamp

Description

Catalog Number

Qty

Symbol Label

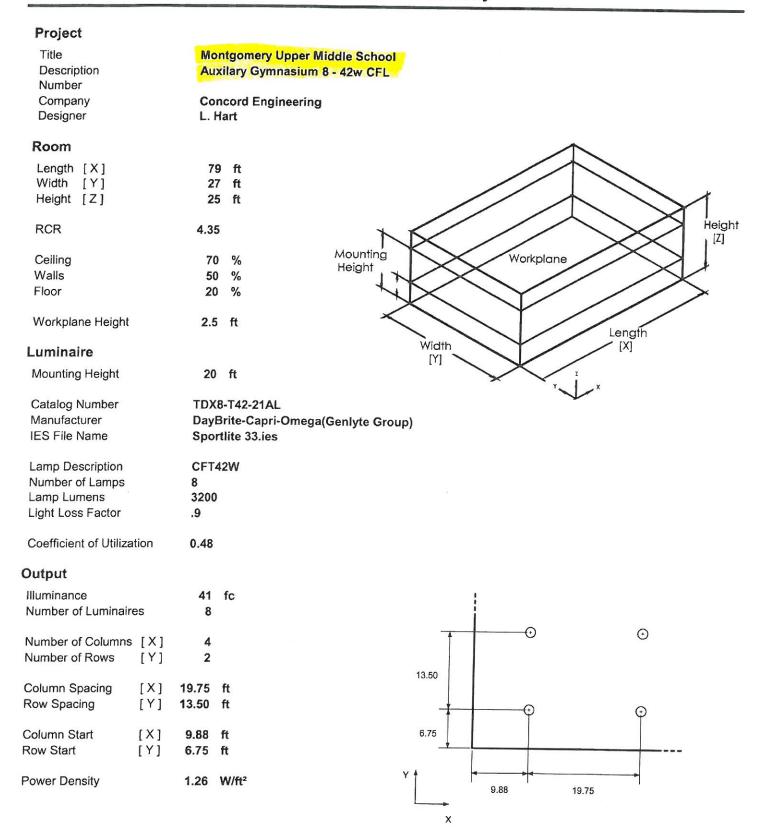
**LUMINAIRE SCHEDULE** 

TDX8-T42-21AL

24

LM-1

Lumens



STATISTICS							
Description	Symbol	Avg	Мах	Min	Max/Min	Ave Min	
Workplane	+	45.5 fc	54.4 fc	37.0 fc	7.12	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
					1:0:1	1.2.1	
LUMINAIRE SC	CHEDULE						
	THE RESERVE THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.						

11	lontgomery Upper Middle Sch Auxilary Gymnasium 8 - 42w CFL Concord Engineering	٨

VISCAL

Watts

1

Lumens

File

337

0.30

3200

Sportlite 33.ies

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SPORTLITE TDX COMPACT FLUORESCENT HIGHBAY W/ 21" ALUMINUM REFLECTOR

Lamp

Description

Catalog Number

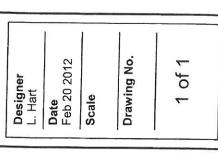
Qty

Symbol Label

TDX8-T42-21AL

 $\infty$ 

LM-1



	0.70	*42.4	0.4	
	48.0	52.6	48.0	
	<del>(</del> 3.5	49.5	3.5	
	49.5	*54.4	+49.5	
	+ 3.55	49.5	÷3,55	
,	48.0	52.6	<sup>+</sup> 48.0	
	°.	42.4	0.70	
		_	14	

Plan View Scale 1"= 10"





### **Industry First**

You will hear people in the industry say "you can't run 8 - 70's in a fixture" and they are right, they can't. They will say, "it's too hot". And for them this is true. But for Sportlite's new "Air Flow" design, our new TDX High Bay with 8 - 70 watt lamps operates so cool, it can be used in 40°C environments. At Sportlite we don't say, "it can't be done" because with the right design it can. That's why, at Sportlite, our motto has always been "Putting Technology In a New Lite".

### Philips Sportlite Exclusive

- The Only Manufacturer Able To Give You 8 -70W Lamps With 41,600 Lumens!
- Approved for 40°C Environments using 8 70 Watt Lamps
- Cool Running Ballast Less than 65°C with 8 70W Lamps (Independent Testing @ 259C)

- For Use With The Following Lamps: 120W, 85W. 70W, 57W, 42W, 32W, 26W (4-85 or 4-120)
- Complete Ballast Chamber Access While Hanging For Easy Maintenance
- · Available with: Clear Polycarbonate Dome, Aluminum Dome, Pearlescent Dome and ABS White Dome
- · Internal Emergency Available with Lamps Up To 42 Watt
- · External Emergency Available with Lamps Up To 70 Watt
- · Plug-In Ballast Connectors
- · 20,000 Hour Lamp Life
- · 3/4" Pendant Mount or Hook, Cord and Plug
- 2, 3, or 4 Level Switching Available
- Dimming Ballast available for some lamp wattages
- · Standard Color White
- · Custom RAL Colors Available

P: 623.930.0074 F: 623.930.0045 www.sportlite.com

> **PHILIPS SPORTLITE**

### TDX SERIES: Starliter Dome

Architectural Grade Compact Fluorescent High Bay

Input Watts:

336 Watts +/- 3% with 42w Lamps

Luminous Efficacy:

88.6 lm/w @ 277V

Initial Lumens per Lamp:

26w 32w 42w 57w 70w 120w 85w 1,800 2,400 3,200 4,300 5,200 6,000 9,000

Total Initial Lumens:

25,600 W/(8) 42 Watt Lamps

Lumen Maintenance: 85%

Efficiency: Color Temperature:

81.3% of rated lumens 3,000k, 3,500k, 4,100k

Lamp Life:

Color Rendering Index: 82 - 84

Base:

20,000 hours GX24q-4 + 2G8

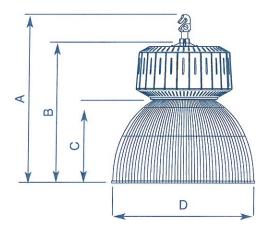
Electronic Ballast:

.98BF, PF=99, THD<2%

Weight:

Approx. 30lbs depending on Accessories used

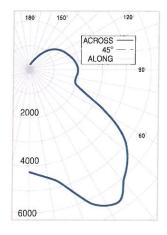
Suitable for 40°C Ambient



# 22" Dome 25" Dome

Α	27.00"	27.85"		
В	23.25"	23.50"		
С	13.75"	14.25"		
D	22.35"	25.00"		





# Specification Information

### **EXAMPLE:**

TDX8-T42-41K-22LEXCP-22CLP-277-4SL-3PEN-EP94-SC

Series	Lamp '	Гуре	Lamp Type	Dome Type
TDX8	T26	26 Watt	27k (26w Only)	22LEXCP 22" Clear Prismatic Poly
TDX8CC	T32	32 Watt	30k	25LEXCP 25" Clear Prismatic Poly
TDX6	T42	42 Watt	35k	5.8 CHOST 701 10.100 2000-003 CD 63-00-00-00-00-00-00-00-00-00-00-00-00-00
TDX6CC	T57	57 Watt	41k	
TDX4	T70	70 Watt		
TDX4CC	PLH85 PLH120	85 Watt (Max. 4 120 Watt (Max.		

Lens Type	Voltage	Swit	tching
NOTE 1			
22CLP 22" Conical Poly Prismatic	120	1SL	1 Switch Leg
22DL3P 22" - 3" Drop Poly Prismatic *	208 *	2SL	2 Switch Legs
22FLPV 22" Flat Poly Clear - Vented	277	3SL	3 Switch Legs
25FLPV 25" Flat Poly Clear - Vented	347 *- (Extra Charge)	4SL	4 Switch Legs
* CANNOT be used with any wireguard			

EP420

EP160

EP94

GTD

### Mounting Options

	6 op
	NOTE 3
3PEN	Pendant by Others
Н	Male Hook
C	Single Circuit Cord 6'
CM	Multi-Circuit Cord 6'
HC	Male Hook & Single Circuit Cord 6'
HCM	Male Hook & Multi-Circuit Cord 6'
HCP	Male Hook, Single Circuit Cord 6'
	& Straight Plug
HCPL	Male Hook, Single Circuit Cord 6'
	& Locking Plug

HCMPL Male Hook, Multi-Circuit Cord 6'

& Locking Plug

Dimming	Ballast Options
ШĖ	NOTE 5, 6, 7 **
DM42-2M7	Advance, Mark VII, 32/42w- Two Lamps,
	57/70w-One Lamp - Note 6
DM42-2MX	Advance, Mark X, 32/42w-Two Lamp,
	57/70w-One Lamp - Note 5
DM42-2SE	Lutron Compact SE, 42w - Two Lamps - Note 7
DM32-2SE	Lutron Compact SE, 32w - Two Lamps - Note 7
DM32-2TU	Lutron, Tu-Wire, 32w - Two Lamps - Note 5
**You must spe	cify the quantity of dimming ballasts required per fixture.

### Accessories

42w-3200 lm - FX

Emergency Ballast Options (Im=lumens)

57w-1160 lm, 70w-1200 lm - EX EP74CST Bodine B74CST, 42w-1000 lm, 32w-750 lm - EX Bodine B75C, One Lamp, 32w-600 lm, 42w-800 lm,

57w-1150 lm, 70w-1300 lm - EX IOTA 1-160, Two Lamp 42w- 3000 lm, One Lamp

57w-2700 lm, One Lamp 70w-2800 lm - EX

Bodine, Generator Transfer Device - IM

Bodine B94C, 750 Lumens, 42w-One Lamp - IM

Bodine B30, Two Lamp, 42w-3500 lm, One Lamp,

IOTA I-42B, One Lamp, 32w-650 lm, 42w-750 lm - IM \* EP42OSD IOTA ISD-420A, One Lamp, 32W-1050 lm, 42w-1300 lm, 57w-1160 lm, 70w-1200 lm, Self-Diagnostic - EX

IOTA I-420A, One Lamp, 32w -1050 lm, 42w-1300 lm,

22WG 22" Wire Guard 25WG 25" Wire Guard 22XWG Wire Guard (For Use with Conical Lens)		SC	6' Safety Cable to Ballast Box
22XWG Wire Guard (For Use with Conical Lens) 22FWG Full Wireguard (Covers Entire Reflector 22FWG In-Line Fuse (One Per Switch Leg) 22XWG Wire Guard (For Use with Conical Lens) 22XWG Wire Guard (For Use		22WG	
ote 7 22FWG Full Wireguard (Covers Entire Reflector FU In-Line Fuse (One Per Switch Leg) DMC Dual Mounting Crossbar		25WG	25" Wire Guard
ote 7 FU In-Line Fuse (One Per Switch Leg) DMC Dual Mounting Crossbar		22XWG	Wire Guard (For Use with Conical Lens)
DMC Dual Mounting Crossbar	ote 7	22FWG	Full Wireguard (Covers Entire Reflector)
a-r o crossus	ote 7	FU	In-Line Fuse (One Per Switch Leg)
rture.		DMC	Dual Mounting Crossbar
	rture.		

Note 1: Only FLPY-XWG can be used with TDX-T57/T70 Note 3: Plug Not Availble with 4 Switch Legs.

Note 4: EX = External Mount IM = Internal Mount (Consult Factory for EM/Cord/Plug Compatibility)

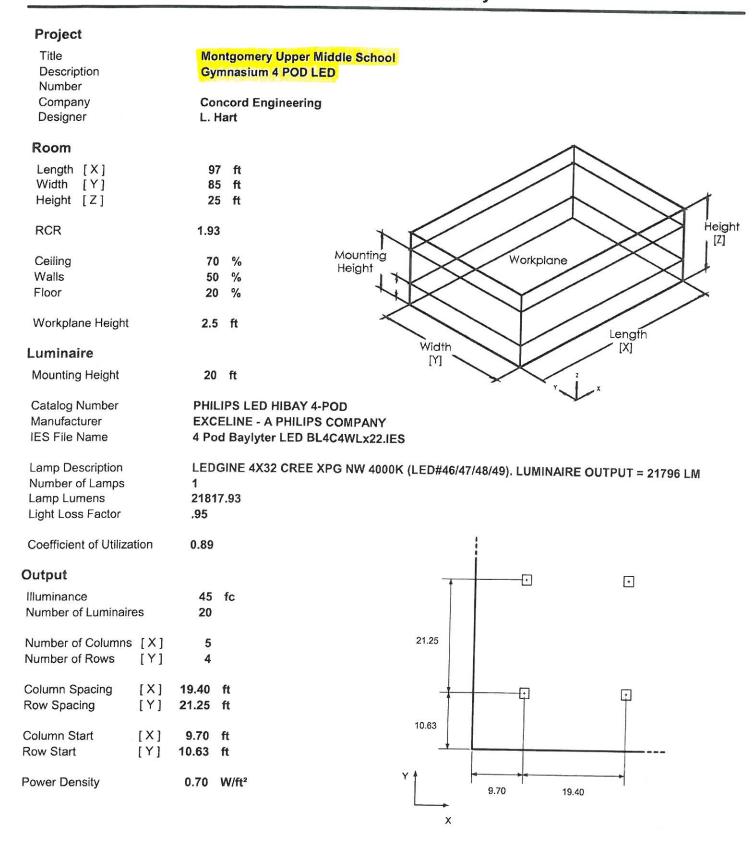
Note 5: Advance Mark X and Lutron Tu-Wire Ballasts Require a 2-Wire Wall Dimmer Note 6: Requires a 2-Wire 0-10 Volt Dimmer in addition to the Normal Hot, Neutral and Ground.

Note 7: Requires one control wire in addition to the normal hot, neutral & ground.

\* IMPORTANT REMINDER: If the lamp on the emergency circuit fails, this ballast will produce an audible sound until the lamp is replaced.

P: 623.930.0074 F: 623.930.0045 www.sportlite.com RIO/IO

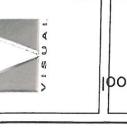




Symbol Avg Max Min Max/Min A					
+ 49.0 fc 58.7 fc 25.5 fc	Avg	Мах	Min	Max/Min	Ava/Min
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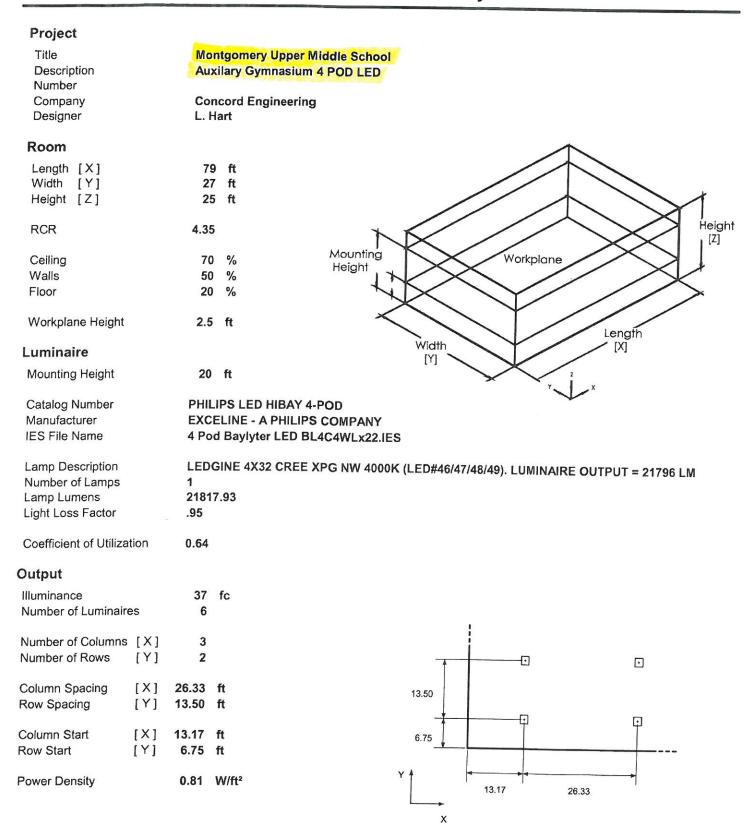
Minte	Watts		287	j			
=	ונו		0.95				
Ilmone III	Fallella		Absolute				
File			4 Pod Baylyter Absolute 0.95		BL4C	ES	
Lamp		<b>LEDGINE 4X32 CREE</b>	XPG NW 4000K	(LED#46/47/48/49),	LUMINAIRE OUTPUT =	21796 LM	
Description		HIBAY WIDE	DISTRIBUTION SOLITE	PRISMALIC LENS			
Symbol Label Qty Catalog Number Description							
Qt		20	ì				
Label		LM-1					
Symbol							



	5.5	44.2	42.3	45.5	42.3	44.2	5.5
	43.3	54.4	51.0	56.1	51.0	54.4	43.3
	<b>43.5</b>	<sup>+</sup> 53.2	F1.6	55.0	51.6	53.2	43.5
	<sup>+</sup> 45.4	56.9	<sup>+</sup> 53.6	58.7	53.6	56.9	<sup>+</sup> 45.4
	44.1	53.9	<del>1</del> 52.3	<sup>+</sup> 55.7	52.3	53.9	44.1
	45.4	56.9	53.6	58.7	53.6	56.9	45.4
ı	13.5	53.2	1.6 91.6	55.0	51.6	53.2	<b>1</b> 3.5
	43.3	54.4	51.0	56.1	51.0	54,4	43.3
ı	±35.5	<sup>+</sup> 44.2	42.3	45.5	42.3	44.2	(1) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4

Plan View

Montgomery Upper Middle Scho Gymnasium 4 POD LED Concord Engineering	Designer L. Hart	<b>Date</b> Feb 20 2012	Scale	Drawing No.	1 of 1	
--	---------------------	----------------------------	-------	-------------	--------	--



	Symbol Avg Max Min Max/Min Avg/Min	+ 41.8 fc 50.2 fc 36.2 fc 1.4:1 1.2:1	
		+ 4,	
STATISTICS	Description	Workplane	

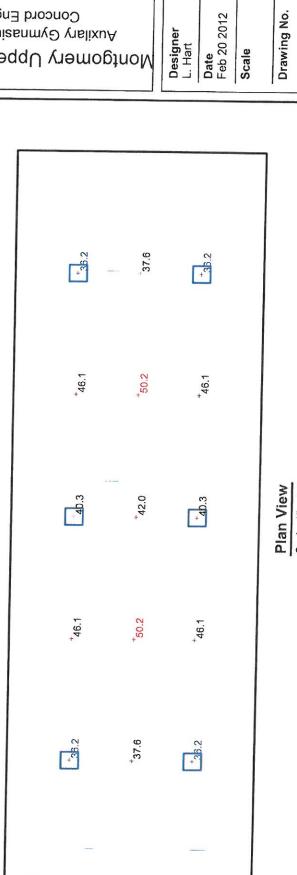
LUMI	NAIRE	SCI	LUMINAIRE SCHEDULE		****		_		
Symbol	Label	QtA	Symbol Label Qty Catalog Number Description	Description	Lamp	File	Lumens 11E	311	Watte
							2000	į	MAIIS
	LM-1	9	HIBAY 4-POD	HIBAY WIDE	LEDGINE 4X32 CREE	4 Pod Rayhtor	40040		
				PRISMATIC LENS	(I FD#46/47/48/49)	1 ED	Apsolute	0.95	787
	-				LUMINAIRE OUTPUT = 21796 LM	BL4C4WLx22.1 ES			

4 D 5 - >

-						-
oou	JOST Middle Sch Sium 4 POD LED Ingineering	Gymna	villary	8	DΜ	Designer
01PU  =			<sup>+</sup> 46.1 <sup>+35.2</sup>		*50.2 37.6	



1 of 1



# Type No. \_\_\_\_\_

# **BayLyter Series LED**

Four-Pod Industrial High-Bay Luminaire

25.51" 64.8 cm

# **APPLICATIONS**

Job. Name \_\_

- · Wide variety of high ceiling applications
- Applications including manufacturing, warehousing, large retail, home centers, cold storage and gymnasiums

# CONSTRUCTION

- · Low profile architectural design
- LED pods and driver housings are made from precision die-cast aluminum for strength
- · Computer designed heat sinks
- Venturi principle for controlled air flow
- · Corrosion resistant polyester powder finish in textured white standard
- · Other colors include textured black and titanium gray

### **ELECTRICAL**

- High power factor electronic integral LED driver(s) (350mA/530mA and 700mA)
- Available in 120-277V or 480V
- Dimming driver standard (control 0 10V DC)
- · Components RoHS compliant
- · Driver is field-replaceable

### **OPTICS**

- · High output LEDs with 32 or 48 per pod
- · LEDs include individual optical lens for precise optical control
- · Wide, medium narrow or aisle distributions
- · Tempered glass lens with molded silicone gasket seals the optical compartment

# **MOUNTING**

 Mounting choices include single pendant/stem or aircraft cable hangers (Aircraft cable hangers supplied standard with base product)

# WARRANTY/LISTINGS

- Published 5 year warranty
- ETL approved for damp locations (IP65 rating as option)
- High-bay and low-bay units for commercial and industrial building are DLC Certified; 700mA configurations only.



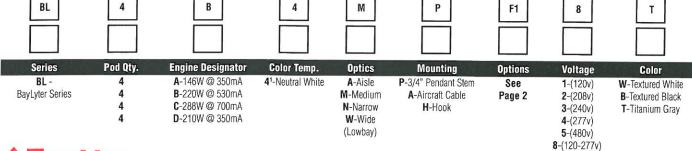


<u>Predicted L70 Lifetime</u> > 100,000 hours @ 25°C (77°F) Up to 100,000 hours @ 45°C (113°F)

(based upon LED manufacturer's supplied LM-80 data and in-situ laboratory testing)

60.4 cm

### Ordering Guide Example: BL4B4MPF1-8T





1611 Clovis R. Barker Road San Marcos, TX 78666 800.545.1326 • 512.392.5821 • Fax: 512.753.1122 www.exceline.com

Notes:

Contact factory for additional color temperature options.



# **BayLyter Series LED**

# Four-Pod **Industrial High-Bay Luminaire**

# **ENGINE DESIGNATOR DETAILS**

<b>Board Size</b>	Current	System Wattage	Lumen Output	Efficacy (L/W)
4 x 48	350mA	210	Contact	Factory
	700mA	288	22,500	78
4 x 32	530mA	220	18,200	83
	350mA	146	12,950	89

<sup>\*</sup> Lumens mentioned are averaged between aisle through wide distribution and lumen output will vary by color temperature options.

### PHOTOMETRIC DATA

		Distribution – Medium						n	C	CT:	NW	1		C	REE XPG LEDs					
Cand	lepower	Lig	jht i	Dist	ribu	utio	n					1	Ave	rage	e Lu	ımi	nan	се		
Angle 0 5 10 15 20	A vg. Candela 10479 10405 10241 10239 10596	Deg 0- 0- 0-	:	9070 15502 21523 22234		% Lamp 40.8 69.7 96.8 100.0		% Luminai 40.8 69.7 96.8 100.0			-	Angle 45 55 65 75 85		End 2780 4923 3483 2293 688		45° 19966 3989 2675 1648 224	3 2 2	Cross 20149 3732 2552 1353 172		
25 30 35	11308 10790 9817	Co								20 F	PER (	pfc=(	0.20)							
40	8000	Ceil		8	-				0			50			30			10		
45 50	4926 1882	Wall RCR	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	
55	769	0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	1102	102	10	
60	538	1	113	109	107		110	107	105	102	103	101	99	99	98	96	96	95	93	
65	390	2	106	101	96	92	104	99	95	91	96	92	89	93	90	87	90	88	86	
70	264	3	100	92	87	82	98	91	86	82	88	84	80	86	82	79	84	81	78	
75	144	4	94	85	79	74	92	84	78	74	82	77	73	80	75	72	78	74	7	
80	59	5	88	78	71	67	86	77	71	66	75	70	66	74	69	65	72	68	64	
85	10	6	82	72	65	60	80	71	64	60	69	64	59	68	63	59	66	62	58	
		7	76	65	58	54	75	65	58	53	63	57	53	62	57	53	61	56	52	
		8	71	60	53	48	70	59	52	48	58	52	48	57	51	47	56	51	47	
		9	66	55	47	42	65	54	47	42	53	47	42	52	46	42	51	46	42	
		10	61	50	42	38	60	49	42	38	48	42	38	47	41	37	46	41	3	

Distribution – Wide								C	CT:	NW		CREE XPG LEDs						S		
Candl	Light Distribution										1	Average Luminance								
Angle 0 5 10 15 20 25	A vg. Candela 3277 3378 3581 3841 4201 4700	0 0	rees -30 -40 -60 -90		Lumens % 3624 7366 19747 22435			16.1 32.8 88.0 100.0		minaire 16.1 32.8 88.0 100.0			55 65 75		40895 9094 2131		45° 31931 40678 5222 905 555	3 3 4 1	Cross 32268 38128 4046 1512 600	
30 35 40	5300 5973 6698	EFFECTIVE FLOOR CAVITY REFL							TANCE '0	20 F	PER (	pfc=0 50	).20)	30			1 10		0	
45	7510	Wall	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	
50 55	8043 7584	0	119	119	119 102	119 99	116 108	116 104	116	116 97	111	111 97	111 94	106 96	106 94	106 91	102	102 90	102 89	
60 65	4679 789	2 3	101	94	88 75	83 68	99	92	86 74	82 68	88	84 72	80 67	85 75	82 70	78	82	79	76	
70 75	298 158	4	84	72	64	57	82	71	63	57	68	62	56	66	60	66 55	73 64	68 59	64 55	
80	67	5	76	63	54	47	74	62	53	47	60	52	47	58	51	46	56	50	46	

### **OPTIONS**

Blank- Glass Lens

F12-	Single Fuse
F22-	Double Fuse
3C-	3' Cord, no Plug
3CD-	3' Cord, no Plug, extra cord for dimming
6C-	6' Cord, no Plug
6CD-	6' Cord, no Plug, extra cord for dimming
	3' Cord and Twist-Lock Plug
	- 3' Cord and Twist-Lock Plug for line voltage, extra
	cord and plug for dimming
6P1,2_	6' Cord and Twist-Lock Plug
6PD1,2	- 6' Cord and Twist-Lock Plug for line voltage, extra
	cord and plug for dimming
N¹-	Indirect Mounting
P-	Protection - IP65 Rating (with cable mounting only

Prismatic Lens Emergency Lampholder (lamp by others)

MC1,2, - 360° Motion Sensor with Control 0 - 10V MA1,2, - 360° Motion Sensor with Adjustable Day Lighting Control

WL - Wet Location

## **ACCESSORIES**

WG- Wire Guard

- Not available with IP65 Rating or wet location listing.
- 2. Specify Voltage.



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<sup>\*</sup> Photometric data based on test performed in compliance with LM79.