BERGEN COUNTY
LAW AND PUBLIC SAFETY INSTITUTE

281 CAMPGAW RD.
MAHWAH, NJ, 07430

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:	Not available
Third Party Supplier:	None

Natural Gas Utility Provider:	Public Service Electric and Gas
Utility Rate Structure:	Not available
Third Party Supplier:	Great Eastern Energy

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 billing data was not available for this facility.

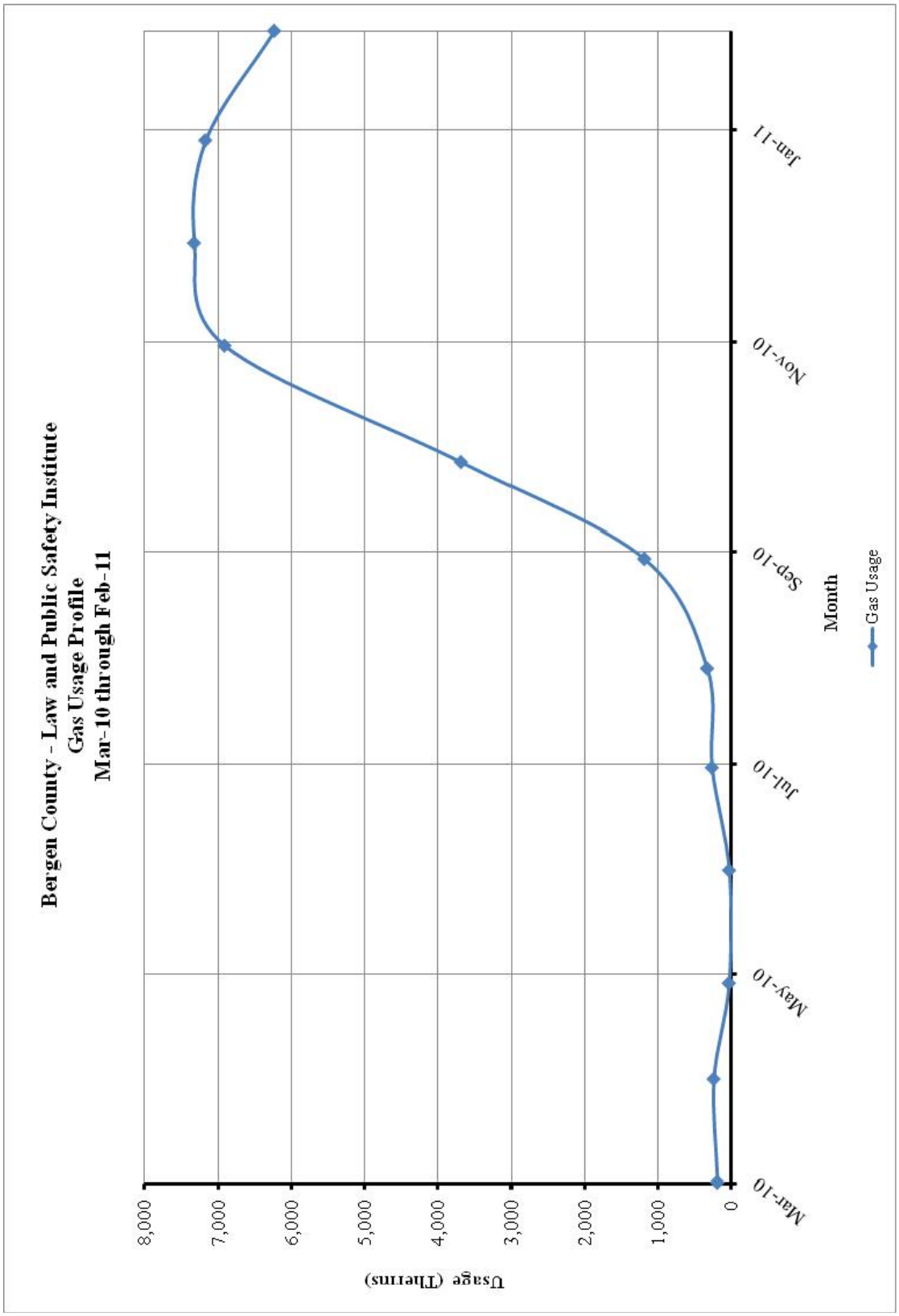
Figure 1
Electricity Usage Profile

Electric usage profile was not available for this facility.

Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: N/A		
Meter No: 3010061, 3274243		
Account #: 65 338 344 01, 66 435 288 01,		
Third Party Utility Provider: Great Eastern Energy		
TPS Meter No: N/A		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-10	182.06	$192.35
Apr-10	232.36	$251.25
May-10	23.74	$43.78
Jun-10	20.75	$42.80
Jul-10	256.17	$325.06
Aug-10	321.90	$362.24
Sep-10	1,181.00	$1,445.24
Oct-10	3,676.24	$3,870.67
Nov-10	6,912.44	$7,375.45
Dec-10	7,329.83	$7,874.79
Jan-11	7,175.96	$7,800.56
Mar-11	6,233.21	$8,792.21
TOTALS	**33,545.65**	**$38,376.40**
AVERAGE RATE:	**$1.14**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The 49,900 SF Bergen County Law and Public Safety Institute Building is a 1 story facility housing professional training school for county police and fire personnel. The facility includes office spaces, classrooms, auditorium, small kitchenette, dining area, storage rooms and mechanical rooms. The typical hours of operation for this facility are between 7:00 AM to 11:00 PM during weekdays and 8:00 AM to 8:00 PM on weekends. The facility HVAC system operation hours follow academic training program. Total attendance of the facility vary during the day between 50 and 400.

Exterior of the building consists of 8" cinder block walls with brick façade along with single pane, ¼" tinted windows with aluminum frames. The amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be well maintained.

The building has a built-up roof with asphalt membrane covering. The estimated amount of insulation below the roofing is 2 inches. The packaged rooftop units are located on the roof of the building while the a hot water boiler, hot water pumps and domestic hot water heater are located in the in two separate boiler rooms. The building was built in 1965 and went through a major expansion in 2000. The expanded section is referred as new section in this report.

HVAC Systems

Bergen County Law and Public Safety Institute heating and air conditioning are achieved via thirteen (13) VVT (variable volume and temperature) Carrier 48TJ rooftop air conditioning units. The units RTU #1-4 and 7-10 are coupled with heat recovery modules to recover the energy in the exhaust stream, which would otherwise be exhaused into the atmosphere. Conditioned air is delivered to the classrooms and the offices via constant volume ducts through zone dampers and ceiling diffusers. Temperature control is achieved via local thermostats modulating the zone dampers for the corresponding space. Since the units are constant volume, static pressure control in the ductwork is achieved via motorized by-pass dampers connected to the supply and return trunks of each unit. The RTU's are equipped with standard, gas fired heat exchangers for primary supply air heating. Carrier48TJ units serve the classrooms, meeting halls, auditorium and administrative offices. The units were installed in 1999 and appear to be in good condition.

It was reported that there are temperature control issues within some of the zones. This may be due to control routines modulating the static pressure in the ductwork. A thorough analysis of the system operation should be performed to identify and eliminate issues.

The computer room is conditioned by a 2.5 Ton cooling only ductless split system made by Carrier. The computer room unit runs 24/7 to cool the computer servers. The split system was installed in 1998 and appears to be in good condition.

A separate make up air unit provides 100% conditioned fresh air to the locker rooms and the showers. The unit is made by Reznor and appears to be in good condition. Reznor unit is equipped with 10 ton DX cooling coils and natural gas fired heating coils. DX cooling is

supplied via a 10-ton Carrier 38AK condensing unit. Both Reznor make up air unit and the Carrier condensing unit were installed in 1999 and appear to be in good condition.

A small portion of the perimeter offices are equipped with electric baseboard heaters. However, it was reported that these units are not used since the forced air heating is found to be adequate for these spaces. Original section boiler room is heated via two large 50 MBH gas-fired unit heaters made by Reznor. The units were installed after one of the boiler header pipes froze and burst. The Reznor unit heaters run during the heating season to keep the boiler room at approximately 72°F.

Exhaust System

Air is exhausted from various spaces via roof mounted exhaust fans. Majority of the exhaust fans are interlocked with the rooftop air conditioning units. The exhaust fans for the mechanical rooms are controlled with tamper proof wall thermostats.

HVAC System Controls

The HVAC systems within the facility are controlled via a building automation system made by Carrier. The system controls all the rooftop air conditioning unit schedules and set-points. Individual zone temperatures are controlled via zone dampers for each space through local thermostats. It was reported that some of the zone temperature controls are problematic.

Domestic Hot Water

Domestic hot water for the bathrooms and the showers in the original building are provided via a split domestic hot water heating system. The system includes two (2) 1,080 MBH AO Smith Hot water boilers and a 750 Gallon domestic hot water retainer tank. Domestic hot water is circulated throughout the building via a pipe mounted circulator.

Domestic hot water for the new section bathrooms and faucets are provided via a 100-Gallon, 400 MBH, gas fired AO Smith domestic hot water heater. The domestic hot water is circulated throughout the new section by a hot water circulation pump. The pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

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 3
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Equipment Upgrade	$1,364	$954	1.4	948.6%
ECM #2	Lighting Controls Upgrade	$11,620	$1,692	6.9	118.4%
ECM #3	Solar domestic hot water heating	$56,000	$3,377	16.6	-9.5%
ECM #4	Install VAV Rooftop Units	$303,263	$6,664	45.5	-56.1%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar Photovoltaic System	$1,761,570	$119,558	14.7	1.8%

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

Table 4
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Equipment Upgrade	1.9	5,779	0
ECM #2	Lighting Controls Upgrade	0	10,255	0
ECM #3	Solar domestic hot water heating	0	0	2,962
ECM #4	Install VAV Rooftop Units	45.8	40,387	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	Solar Photovoltaic System	195.7	239,115	0

Table 5
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 Equipment Upgrade	$954	$2,704	$1,340	$1,364	1.4
Lighting Controls Upgrade	$1,692	$12,600	$980	$11,620	6.9
Solar domestic hot water heating	$3,377	$56,000	$0	$56,000	16.6
Design / Construction Extras (15%)		$10,696		*$10,696*	
Total Project	**$6,023**	**$82,000**	**$11,877**	**$79,680**	**13.2**

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 Equipment Upgrade

Description:

The majority of the interior lighting throughout this facility 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, some of the storage areas, locker room and gym areas, offices, auditorium, classrooms, restrooms and kitchen areas still have a variety of older fluorescent fixtures with magnetic ballasts and incandescent lamps. It is recommended to retrofit or replace all of the older fluorescent fixtures and the incandescent lights in these areas with high efficiency fluorescent T8 or T5 fixtures with electronic ballasts or 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.

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.

Rebates and Incentives:

NJ Smart Start® Program Incentives are calculated using the **Smart Start® Incentive Appendix** as follows:

Retrofit of existing 32 watt T-8 system to reduced wattage (28w/25w 4')	$10 per fixture (1-4 lamps)

$$\text{Smart Start® Incentive} = (\#\ \text{of fixtures} \times \$10) = 134 \times \$10 = \$1340$$

Replacement and Maintenance Savings:

There is no significant replacement and maintenance savings due to this ECM.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,704
NJ Smart Start Equipment Incentive ($):	$1,340
Net Installation Cost ($):	$1,364
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$954
Total Yearly Savings ($/Yr):	$954
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.4
Simple Lifetime ROI	948.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$14,303
Internal Rate of Return (IRR)	70%
Net Present Value (NPV)	$10,018.84

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in this facility 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 25% of the total light energy controlled by occupancy sensors and daylight 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:

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

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

Cost and Incentives:

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) are as follows:

Dual Technology Occupancy Sensor - Switch Mount	$150 per installation
Dual Technology Occupancy Sensor - Remote Mount	$450 per installation
Dual Tech. Occupancy Sensor w/2 Pole Relay - Remote Mount	$500 per installation

Cost includes material and labor.

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

Occupancy Sensor Fixture Mounted (existing facility only) = $20 per sensor
Occupancy Sensor Remote Mounted (existing facility only) = $35 per sensor

$$\text{Smart Start® Incentive} = (\#\text{ of wall mount} \times \$\,20) + (\#\text{of ceiling mount} \times \$35)$$

$$\text{Smart Start® Incentive} = (0\text{ wall mount} \times \$\,20) + (28\text{ ceiling mount} \times \$35) = \$980$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$12,600
NJ Smart Start Equipment Incentive ($):	$980
Net Installation Cost ($):	$11,620
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,692
Total Yearly Savings ($/Yr):	$1,692
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.9
Simple Lifetime ROI	118.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$25,381
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	$8,579.96

ECM #3: Solar Domestic Hot Water System

Description:

Bergen County Law and Public Safety Institute operates with a nearly year round demand for hot water production. The hot water is supplied by gas fired domestic hot water heaters. The efficiency of the existing hot water heating system is based on the efficiency of the existing hot water heaters.

This ECM includes the installation of a solar thermal system to produce domestic hot water. The system includes thermal panels mounted over the roof of the existing boiler plant, piping distribution to the domestic hot water tanks, a pre-heat hot water heat exchanger, solar PV panels and pumps for glycol distribution, and controls. The system features a pre-heat tank with the existing tanks still in place as a back-up means for hot water production to ensure no loss of hot water production. The calculations are based on Viesmann Flat Plat collectors model VITOSOL 200F or equivalent.

Energy Savings Calculations:

$$\text{DHW Load} = \left(\text{Summer Energy Usage}\left(\frac{\text{Therms}}{\text{Month}}\right) \times 12(\text{Months}) \times \text{Eff}(\%) \times \text{Heating Value}\left(\frac{\text{Btu}}{\text{Therms}}\right)\right)$$

$$\text{Solar Sys Heat}\,\% = \frac{\text{Solar Heat}(\text{kBtu})}{\text{DHW Load}(\text{kBtu})}$$

$$\text{Gas Usage Reduction} = \text{Summer Gas Usage}\left(\frac{\text{Therms}}{\text{Month}}\right) \times 12(\text{Months}) \times \text{Domestic HW Heater Efficiency},\%$$

$$\text{Savings} = \text{Gas Usage Reduction} \times \text{Ave Cost}\left(\frac{\$}{\text{Therms}}\right)$$

Below is the average domestic hot water usage calculation table with the solar domestic hot water heating calculation tables.

Existing Domestic Hot Water Parameters:

Ave Gas Cost	= $1.14/Therm
Estimated Domestic Water Heating Efficiency	= 80%
Estimated monthly non-space heating gas usage (Dom HW)	= 289 Therms*

(*Averaged from Jul - Aug gas usage)

Solar Thermal System Parameters:

See the **Solar Domestic Hot Water Heater Appendix** for detailed calculations.

Solar Thermal System Production: 236,979 kBtu/Yr

SOLAR THERMAL CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	HW Heaters	Solar Thermal Sys w/ HW Heaters	-
Ave Monthly Gas Usage for DHW (Therms)	289	-	-
Hot Water Heater Efficiency (%)	80%	80%	-
Gas Heat Value (BTU/Therm)	100,000	100,000	-
DHW Load (MMBTUs)	277	277	-
Solar Thermal Sys. Production (MMBTUs)	0.0	237	237
Solar Thermal Sys. Heat % of Baseline (MMBTUs)	0.0	85.4%	1
Gas Cost ($/Therm)	1.14	1.14	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	3,468	506	2,962
Energy Cost ($)	$3,954	$577	$3,377
COMMENTS:	This ECM is based on solar thermal hot water production from the solar thermal hot water calucation appendix. Monthly consumption estimated based on utility data provided by the facility.		

Installed cost of the solar thermal system including panels, piping, equipment, heat exchanger, pumps, and controls is estimated to be $56,000.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$56,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$56,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,377
Total Yearly Savings ($/Yr):	$3,377
Estimated ECM Lifetime (Yr):	15
Simple Payback	16.6
Simple Lifetime ROI	-9.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$50,654
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	($15,686.13)

ECM #4: Install VAV Rooftop Units

Description:

Air conditioning for the Bergen County Law and Public Safety Institute is provided with VVT (Variable Volume and Temperature) HVAC system containing constant volume rooftop air conditioning units, bypass dampers and energy recovery ventilators. The packaged rooftop units are approximately 12 years old and inefficient compared to current HVAC equipment efficiency standard and expectations.

The older, standard efficiency, constant volume rooftop units can be replaced with new high efficiency VAV (Variable Air Volume) units for energy savings. New air conditioners provide higher full load and part load efficiencies due to advances in high efficiency inverter motor technologies, heat exchangers, refrigerants and variable frequency drives.

This ECM includes one-for-one replacement of the older air conditioning units 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 replacements 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 1, 7, 11	Various	3	180,000	45	Trane Voyager - 180
RTU 2, 5, 6, 12	Various	4	102,000	34	Trane Precedent 102
RTU 3	Various	1	240,000	20	Trane Voyager - 140
RTU 4, 8, 9, 10	Various	4	120,000	40	Trane Precedent - 120
Total		**12**	**642,000**	**139**	

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	**COOLING CAPACITY, BTU/Hr**	**ANNUAL COOLING HOURS**	**EXISTING UNITS (S)EER**	**SPLIT UNITS (S)EER**	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
RTU 1, 7, 11	180,000	800	8.6 EER	11.5 EER	3	12,667	15.8
RTU 2, 5, 6, 12	102,000	1,200	10 SEER	13 SEER	4	11,298	9.4
RTU 3	240,000	800	8.5 EER	10.6 EER	1	4,475	5.6
RTU 4, 8, 9, 10	120,000	800	9 EER	12.5 EER	4	11,947	14.9
Total					12	40,387	45.8

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:

$$\text{SmartStart® Incentive} = (\text{Cooling Tons} \times \$/\text{Ton Incentive})$$

UNITARY / 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	20	$1,580
≥ 11.25 to < 20 tons	11.5 EER	79	45	$3,555
≥ 5.4 to < 11.25 tons	11.5 EER	73	74	$5,402
5.4 tons or less Unitary AC and Split System	≥14 SEER	$92	0.0	$0
TOTAL			**139**	**$10,537**

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 1, 7, 11	$29,400	3	$88,200	$3,555	$84,645	$2,090	40.5
RTU 2, 5, 6, 12	$22,300	4	$89,200	$2,482	$86,718	$1,864	46.5
RTU 3	$38,400	1	$38,400	$1,580	$36,820	$738	49.9
RTU 4, 8, 9, 10	$24,500	4	$98,000	$2,920	$95,080	$1,971	48.2
Total		12	$313,800	$10,537	$303,263	$6,664	45.5

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$313,800
NJ Smart Start Equipment Incentive ($):	$10,537
Net Installation Cost ($):	$303,263
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,664
Total Yearly Savings ($/Yr):	$6,664
Estimated ECM Lifetime (Yr):	20
Simple Payback	45.5
Simple Lifetime ROI	-56.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$133,279
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	($204,120.45)

REM #1: 195.7 kW Solar Photovoltaic System

Description:

The Bergen County Law & Public Safety Institute has approximately 13,900 square-foot of a combination of available roof and parking lot spaces that can accommodate a combination of roof mounted and parking lot canopy mounted solar arrays with a 195.7 kW total electricity generation capacity.

The array will produce approximately 239,115 kilowatt-hours of electricity annually, whicht will dramatically reduce the overall electric usage of the facility (Actual total electricity consumption of this facility was not available during this audit).

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,761,570
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$1,761,570
Maintenance Savings ($/Yr):	$83,690
Energy Savings ($/Yr):	$35,867
Total Yearly Savings ($/Yr):	$119,558
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.7
Simple Lifetime ROI	1.8%
Simple Lifetime Maintenance Savings	$1,255,354
Simple Lifetime Savings	$1,793,363
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($334,300.33)

V. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

E. 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.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Bergen County - Law & Public Safety Institute

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Equipment Upgrade	$2,704	$0	$1,340	$1,364	$954	$0	$954	15	$14,303	$0	948.6%	1.4	69.88%	$10,018.84
ECM #2	Lighting Controls Upgrade	$3,780	$8,820	$980	$11,620	$1,692	$0	$1,692	15	$25,381	$0	118.4%	6.9	11.85%	$8,579.96
ECM #3	Solar domestic hot water heating	$56,000	$0	$0	$56,000	$3,377	$0	$3,377	15	$50,654	$0	-9.5%	16.6	-1.23%	($15,686.13)
ECM #4	Install VAV Rooftop Units	$224,200	$89,600	$10,537	$303,263	$6,664	$0	$6,664	20	$133,279	$0	-56.1%	45.5	-6.81%	($204,120.45)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar Photovoltaic System	$1,761,570	$0	$0	$1,761,570	$35,867	$83,690	$119,558	15	$1,793,363	$1,255,354	1.8%	14.7	0.22%	($334,300.33)

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

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

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 - $93 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 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$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 (1-2 lamps) $30 per fixture (3-4 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	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 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
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 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%

STATEMENT OF ENERGY PERFORMANCE

Bergen County - Law and Public Safety Institute

Not able to generate report due to incomplete utility data.

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Rooftop / AC Units

Tag	RTU-1	RTU-2	RTU-3
Unit Type	Rooftop AC Unit with Energy recovery	Rooftop AC Unit with Energy recovery	Rooftop AC Unit with Energy recovery
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	-	-	Auditorium
Manufacturer	Carrier	Carrier	Carrier
Model # / Serial #	48TJ	48TJ	48TJD024 / 1499F09868
Cooling Type	Direct expansion	Direct expansion	Direct expansion
Cooling Capacity (Tons)	15	8.5	20
Cooling Efficiency (SEER/EER)	8.6 EER 9.3 IPLV	9 EER 9 IPLV	8.5 EER 8.5 IPLV
Heating Type	Natural Gas	Natural Gas	Natural Gas
Heating Input (MBH)	230	125	275
Efficiency	81%	80%	81%
Fuel	Natural Gas	Natural Gas	Natural Gas
Supply Fan Motor HP	5	5 (Est)	7.5 HP
Approx Age	12	12	12
ASHRAE Service Life	15	15	15
Remaining Life	3	3	3
Comments	Constant volume unit with Energy Recovery Ventilator.	Constant volume unit with Energy Recovery Ventilator	Constant volume unit with Energy Recovery Ventilator

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Rooftop / AC Units

Tag	RTU-4	RTU-5	RTU-6
Unit Type	Rooftop AC Unit with Energy recovery	Rooftop AC Unit	Rooftop AC Unit
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	Cafeteria, by-pass, class	Lobby	Lobby
Manufacturer	Carrier	Carrier	Carrier
Model # / Serial #	48TJD012---611-- / 1799G31189	48TJD009-M-611AA / 1799G30253	48TJD009-M-611AA / 1799G30254
Cooling Type	Direct expansion	Direct expansion	Direct expansion
Cooling Capacity (Tons)	10	8.5	8.5
Cooling Efficiency (SEER/EER)	9 EER 9.4 IPLV	9 EER 9 IPLV	9 EER 9 IPLV
Heating Type	Natural Gas	Natural Gas	Natural Gas
Heating Input (MBH)	180	125	125
Efficiency	80%	80%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Supply Fan Motor HP	5 (Est)	5 (Est)	5 (Est)
Approx Age	12	12	12
ASHRAE Service Life	15	15	15
Remaining Life	3	3	3
Comments	Constant volume unit with Energy Recovery Ventilator	Constant volume unit	Constant volume unit

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Rooftop / AC Units

Tag	RTU-7	RTU-8	RTU-9
Unit Type	Rooftop AC Unit with Energy recovery	Rooftop AC Unit with Energy recovery	Rooftop AC Unit with Energy recovery
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	CR 221, 222, F.Locker, E. Hall	CR 207	CR 209
Manufacturer	Carrier	Carrier	Carrier
Model # / Serial #	48TJD016- / 1699F13346	48TJD012---611-- / 1799G31188	48TJD012---611-- / 1799G31190
Cooling Type	Direct expansion	Direct expansion	Direct expansion
Cooling Capacity (Tons)	15.0	10	10
Cooling Efficiency (SEER/EER)	8.6 EER 9.3 IPLV	9 EER 9.4 IPLV	9 EER 9.4 IPLV
Heating Type	Natural Gas	Natural Gas	Natural Gas
Heating Input (MBH)	230	180	180
Efficiency	81%	80%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Supply Fan Motor HP	5	5 (Est)	5 (Est) Standard
Approx Age	12	12	12
ASHRAE Service Life	15	15	15
Remaining Life	3	3	3
Comments	Constant volume unit with Energy Recovery Ventilator	Constant volume unit with Energy Recovery Ventilator	Constant volume unit with Energy Recovery Ventilator

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Rooftop / AC Units

Tag	RTU-10	RTU-11	RTU-12
Unit Type	Rooftop AC Unit with Energy recovery	Rooftop AC Unit	Rooftop AC Unit
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	Rms 130, 131, ITV, Admin,	Roms, 109-113, 115, 116, 118-121,126, 129	108
Manufacturer	Carrier	Carrier	Carrier
Model # / Serial #	48TJD012---611-- / 1799G31191	48TJD016- / 1699F13346	48TJD009-M-611AA / 1599G30271
Cooling Type	Direct expansion	Direct expansion	Direct expansion
Cooling Capacity (Tons)	10	15.0	8.5
Cooling Efficiency (SEER/EER)	9 EER 9.4 IPLV	8.6 EER 9.3 IPLV	9 EER 9 IPLV
Heating Type	Natural Gas	Natural Gas	Natural Gas
Heating Input (MBH)	180	230	125
Efficiency	80%	81%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Supply Fan Motor HP	5 (Est)	5	3 (Est)
Approx Age	12	12	12
ASHRAE Service Life	15	15	15
Remaining Life	3	3	3
Comments	Constant volume unit with Energy Recovery Ventilator	Constant volume unit	Constant volume unit

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Rooftop / AC Units

Tag	RTU-13		
Unit Type	Rooftop AC Unit		
Qty	1		
Location	Roof		
Area Served	Wieght Room		
Manufacturer	Carrier		
Model # / Serial #	48TJD005-601GA / 0799G20848		
Cooling Type	Direct expansion		
Cooling Capacity (Tons)	3.0		
Cooling Efficiency (SEER/EER)	8.7 EER 9.7 SEER		
Heating Type	Natural Gas		
Heating Input (MBH)	74		
Efficiency	80%		
Fuel	Natural Gas		
Supply Fan Motor HP	3 (Est)		
Approx Age	12		
ASHRAE Service Life	15		
Remaining Life	3		
Comments	Constant volume unit		

MAJOR EQUIPMENT LIST

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Bergen County - Law & Public Safety Institute

Split AC Units and Condensers

Tag	CU		
Unit Type	Ductless Split		
Qty	1		
Location	Roof		
Area Served	Computer Room		
Manufacturer	Carrier		
Condensing Unit Model / Serial #	38HDC0300321		
Air Handler Model / Serial #	1598X57211		
Cooling Capacity (Tons)	3		
Cooling Efficiency (SEER/EER)	10 SEER		
Heating Type	-		
Heating Input (MBH)	-		
Efficiency	-		
Approx Age	13		
ASHRAE Service Life	15		
Remaining Life	2		
Comments			

MAJOR EQUIPMENT LIST

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Bergen County - Law & Public Safety Institute

Make-up Air Systems

Tag	MUA		
Unit Type	Split Rooftop MUA		
Qty	1		
Location	Roof		
Area Served	Locker rooms		
Manufacturer	Carrier Condensing Unit.		
Condensing Unit Model / Serial #	38AKS016---610--0699F97647		
Air Handler Model / Serial #	N/A		
Cooling Capacity (Tons)	10		
Cooling Efficiency (SEER/EER)	11 EER 14.9 IPLV		
Heating Type	Natural Gas		
Heating Input (MBH)	300 (Est)		
Efficiency	80%		
Approx Age	12		
ASHRAE Service Life	15		
Remaining Life	3		
Comments	2500 CFM 100% Outside Air		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Boilers

Tag	HWH		
Unit Type	Split hot water heating system		
Qty	2 boilers		
Location	Boiler room		
Area Served	Original facility lavatories, showers and		
Manufacturer	AO Smith		
Model #	DW-1080S112E		
Serial #	098 45900		
Input Capacity (MBH)	1,080		
Rated Output Capacity (MBH)	708		
Approx. Efficiency %	66%		
Fuel	Natural Gas		
Approx Age	12		
ASHRAE Service Life	30		
Remaining Life	18		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Domestic Water Heaters

Tag	HWH-1	HWH	
Unit Type	Domestic hot water heater tank	Split hot water heating tank /heat exchanger	
Qty	1	1 heat exchanger tank	
Location	Elecrtrical Room	Boiler room	
Area Served	Facility new section	Original facility lavatories, showers & kitchen	
Manufacturer	AO Smith	AO Smith	
Model #	BTC 400 970	TJV-750A	
Serial #	MC99-0824722-970	SC99-78014 Y5	
Size (Gallons)	100	750 Gal	
Input Capacity (MBH/KW)	399 MBH	2 x 708 MBH	
Recovery (Gal/Hr)	363	2 x 859	
Efficiency %	80%	-	
Fuel	Natural Gas	-	
Approx Age	2	12	
ASHRAE Service Life	12	12	
Remaining Life	10	0	
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Pumps

Tag	DHW Circulator	DHW Circulator	
Unit Type	Pipe mounted circulator	Pipe mounted circulator	
Qty	1	1	
Location	New section electrical room	Original section	
Area Served	New section domestic hot water loop	Original section	
Manufacturer	Taco	-	
Model #	-	-	
Serial #	-	-	
Horse Power	Fractional	Fractional	
Flow	-	-	
Motor Info	-	-	
Electrical Power	120/1	120/1	
RPM	-	-	
Motor Efficiency %	-	-	
Approx Age	2	10	
ASHRAE Service Life	20	20	
Remaining Life	18	10	
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County - Law & Public Safety Institute

Unit Heaters

Tag	Electric Unit Heater	Gas Unit Heater	
Unit Type	Wall hung unit heater	Ceiling hung unit heater	
Qty	1	2	
Location	New section electrical room	Boiler room	
Area Served	Electrical room	Boiler room	
Manufacturer	-	Reznor	
Model #	-	-	
Serial #	-	-	
Input Capacity (MBH)	-	50 (Est)	
Rated Output Capacity (MBH)	-	40 (Est)	
Approx. Efficiency %	1	0.8	
Fuel	Electric	Natural Gas	
Approx Age	1100%	200%	
ASHRAE Service Life	18	18	
Remaining Life	7	16	
Comments	Unit on non-programmable tstat and	Unit none programmable.	

Investment Grade Lighting Audit

CEG Job #: 9C10085
Project: Law & Public Saftey Institute
281 Campgaw Rd
Mahwah, NJ
Bldg. Sq. Ft. 9,914

Law & Public Saftey Institute

KWH COST: $0.165

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	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 Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
562	Lobby	3600	38	1	Recessed Down Light, (1) 42w CFL Lamp	42	1.60	5,745.6	$948.02	38	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
564		3600	7	1	Uplight (1) 42w CFL Lamp	42	0.29	1,058.4	$174.64	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Boiler Room	2200	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	545.6	$90.02	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	440	$72.60	$14.00	$56.00	0.05	105.6	$17.42	3.21
221.11	Electric Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	148.8	$24.55	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$19.80	$14.00	$28.00	0.02	28.8	$4.75	5.89
221.34	Boiler/Mech Room	2200	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.46	1,020.8	$168.43	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Corridor	4400	32	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	2.75	12,108.8	$1,997.95	32	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	2.30	10137.6	$1,672.70	$21.00	$672.00	0.45	1971.2	$325.25	2.07
232.22	Classroom 222	2600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.86	2,236.0	$368.94	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Classroom 221	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,341.6	$221.36	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Woman's Locker Room 223	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$61.78	$21.00	$42.00	0.03	72.8	$12.01	3.50
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	$55.77	2	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.10	254.8	$42.04	$24.00	$48.00	0.03	83.2	$13.73	3.50
232.21		2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$61.78	$21.00	$42.00	0.03	72.8	$12.01	3.50
232.21	Hall	3000	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	1,032.0	$170.28	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	864	$142.56	$21.00	$84.00	0.06	168	$27.72	3.03
232.21	Men's Locker Room	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,788.8	$295.15	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$247.10	$21.00	$168.00	0.11	291.2	$48.05	3.50
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	$27.89	1	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	127.4	$21.02	$24.00	$24.00	0.02	41.6	$6.86	3.50
232.22	Multi Purpose Room 204 & 207	2600	58	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	4.99	12,968.8	$2,139.85	58	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Open Office	2600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.86	2,236.0	$368.94	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Side Office (3)	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,341.6	$221.36	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	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 Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.22	Office	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	670.8	$110.68	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Instructor's Locker Room 216	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	$147.58	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$123.55	$21.00	$84.00	0.06	145.6	$24.02	3.50
560		2600	2	1	Recessed Down Light, 26w CFL Lamp	26	0.05	135.2	$22.31	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Gym 215	3000	9	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.77	2,322.0	$383.13	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21		3000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	516.0	$85.14	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	432	$71.28	$21.00	$42.00	0.03	84	$13.86	3.03
232.21	Vending 211	3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$153.25	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	777.6	$128.30	$21.00	$63.00	0.04	151.2	$24.95	2.53
232.21	Kitchen 210	3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$153.25	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	777.6	$128.30	$21.00	$63.00	0.04	151.2	$24.95	2.53
232.22	Lunch Room	3600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	1,238.4	$204.34	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Café 212	3600	13	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.12	4,024.8	$664.09	13	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	104 EMT Office	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	103 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2,683.2	$442.73	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Men's Restroom	3000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	774.0	$127.71	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	648	$106.92	$21.00	$63.00	0.04	126	$20.79	3.03
232.21	Women's Restroom	3000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	774.0	$127.71	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	648	$106.92	$21.00	$63.00	0.04	126	$20.79	3.03
232.21	105 Office	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$61.78	$21.00	$42.00	0.03	72.8	$12.01	3.50
232.22	Admin Side Offices (4)	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$295.15	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	109 Mail Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	$27.89	1	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	127.4	$21.02	$24.00	$24.00	0.02	41.6	$6.86	3.50
222.21	109 Coffee Room	2600	1	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	161.2	$26.60	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$21.45	$14.00	$14.00	0.01	31.2	$5.15	2.72
232.21	Women's Restroom	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	223.6	$36.89	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	187.2	$30.89	$21.00	$21.00	0.01	36.4	$6.01	3.50
227.21	Small Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	$167.31	6	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.29	764.4	$126.13	$24.00	$144.00	0.10	249.6	$41.18	3.50

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	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 Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.21	118 File Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.52	1,341.6	$221.36	6	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.43	1123.2	$185.33	$21.00	$126.00	0.08	218.4	$36.04	3.50
227.21	Hall	2600	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	845.0	$139.43	5	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.25	637	$105.11	$24.00	$120.00	0.08	208	$34.32	3.50
232.21	120 Storage	1200	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	206.4	$34.06	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	172.8	$28.51	$21.00	$42.00	0.03	33.6	$5.54	7.58
232.21	204 Storage	1200	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	309.6	$51.08	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	259.2	$42.77	$21.00	$63.00	0.04	50.4	$8.32	7.58
232.22	207 Storage	1200	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	412.8	$68.11	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Driver Training	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	$167.31	6	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.29	764.4	$126.13	$24.00	$144.00	0.10	249.6	$41.18	3.50
227.21	208 Storage	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78.0	$12.87	1	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	58.8	$9.70	$24.00	$24.00	0.02	19.2	$3.17	7.58
232.22	202 Classroom	2600	21	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.81	4,695.6	$774.77	21	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	301 Conference Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,341.6	$221.36	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.22		2600	4	3	2x2, 3 Lamp, 17w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	52	0.21	540.8	$89.23	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	302 Classroom	2600	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	3,577.6	$590.30	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Men's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$61.78	$21.00	$42.00	0.03	72.8	$12.01	3.50
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	$27.89	1	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	127.4	$21.02	$24.00	$24.00	0.02	41.6	$6.86	3.50
232.21	Women's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$61.78	$21.00	$42.00	0.03	72.8	$12.01	3.50
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	$27.89	1	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	127.4	$21.02	$24.00	$24.00	0.02	41.6	$6.86	3.50
221.41	314 Storage	1200	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	58	0.17	208.8	$34.45	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	180	$29.70	$14.00	$42.00	0.02	28.8	$4.75	8.84
232.22	313 Classroom	2600	24	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	2.06	5,366.4	$885.46	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	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 Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.22	311 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2,683.2	$442.73	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	310 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2,683.2	$442.73	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	309 A/V Room	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.22	308 Conference Room	2600	12	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.70	1,809.6	$298.58	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	306 Ready Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,341.6	$221.36	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	307 Office	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	670.8	$110.68	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	305 Break Room	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Corridor	3600	16	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.99	3,571.2	$589.25	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	2880	$475.20	$14.00	$224.00	0.19	691.2	$114.05	1.96
237.22	Hall Of Heros	2600	102	3	2x2, 3 Lamp, 17w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	52	5.30	13,790.4	$2,275.42	102	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	202 Storage	1200	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	206.4	$34.06	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
560	Exterior	4400	6	1	Recessed Down Light, 26w CFL Lamp	26	0.16	686.4	$113.26	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
713		4400	18	1	100w HPS 1x1 w/Prismatic Lens	125	2.25	9,900.0	$1,633.50	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
725		4400	5	1	150w HPS Wallpack	188	0.94	4,136.0	$682.44	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
711		4400	4	1	100w HPS Bollards	125	0.50	2,200.0	$363.00	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		597	171				132,201	$21,813	597	82			8.5	26,885	$4,436		$2,704	1.9	5,779	$954	2.84

CEG Job #: 9C10085
Project: Law & Public Saftey Institute
Address: 281 Campgaw Rd
Mahwah, NJ
Building SF: 9,914

Law & Public Saftey Institute

KWH COST: $0.165

FALSE

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
562	Lobby	3600	38	1	Recessed Down Light, (1) 42w CFL Lamp	42	1.60	5745.6	$948.02	38	0	No Change	42	1.60	0%	5745.6	$948.02	$0.00	$0.00	0.00	0	$0.00	0.00
564		3600	7	1	Uplight (1) 42w CFL Lamp	42	0.29	1058.4	$174.64	7	0	No Change	42	0.29	0%	1058.4	$174.64	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Boiler Room	2200	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	545.6	$90.02	4	0	No Change	62	0.25	0%	545.6	$90.02	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Electric Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	148.8	$24.55	2	0	No Change	62	0.12	0%	148.8	$24.55	$0.00	$0.00	0.00	0	$0.00	0.00
221.34	Boiler/Mech Room	2200	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.46	1020.8	$168.43	8	0	No Change	58	0.46	0%	1020.8	$168.43	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Corridor	4400	32	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	2.75	12108.8	$1,997.95	32	0	No Change	86	2.75	0%	12108.8	$1,997.95	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Classroom 222	2600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.86	2236	$368.94	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.69	20%	1788.8	$295.15	$0.00	$450.00	0.17	447.2	$73.79	6.10
232.22	Classroom 221	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1341.6	$221.36	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.41	20%	1073.28	$177.09	$0.00	$450.00	0.10	268.32	$44.27	10.16
232.21	Woman's Locker Room 223	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	0	No Change	86	0.17	0%	447.2	$73.79	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	$55.77	2	0	No Change	65	0.13	0%	338	$55.77	$0.00	$0.00	0.00	0	$0.00	0.00
232.21		2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	0	No Change	86	0.17	0%	447.2	$73.79	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Hall	3000	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	1032	$170.28	4	0	No Change	86	0.34	0%	1032	$170.28	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Men's Locker Room	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1788.8	$295.15	8	0	No Change	86	0.69	0%	1788.8	$295.15	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169	$27.89	1	0	No Change	65	0.07	0%	169	$27.89	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Multi Purpose Room 204 & 207	2600	58	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	4.99	12968.8	$2,139.85	58	0	No Change	86	4.99	0%	12968.8	$2,139.85	$0.00	$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.22	Open Office	2600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.86	2236	$368.94	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.69	20%	1788.8	$295.15	$0.00	$450.00	0.17	447.2	$73.79	6.10
232.22	Side Office (3)	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1341.6	$221.36	6	0	No Change	86	0.52	0%	1341.6	$221.36	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Office	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	670.8	$110.68	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	536.64	$88.55	$0.00	$450.00	0.05	134.16	$22.14	20.33
232.21	Instructor's Locker Room 216	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	894.4	$147.58	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.28	20%	715.52	$118.06	$0.00	$450.00	0.07	178.88	$29.52	15.25
560		2600	2	1	Recessed Down Light, 26w CFL Lamp	26	0.05	135.2	$22.31	2	0	No Change	26	0.05	0%	135.2	$22.31	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Gym 215	3000	9	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.77	2322	$383.13	9	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.62	20%	1857.6	$306.50	$0.00	$450.00	0.15	464.4	$76.63	5.87
232.21		3000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	516	$85.14	2	0	No Change	86	0.17	0%	516	$85.14	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Vending 211	3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$153.25	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	743.04	$122.60	$0.00	$450.00	0.05	185.76	$30.65	14.68
232.21	Kitchen 210	3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$153.25	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	743.04	$122.60	$0.00	$450.00	0.05	185.76	$30.65	14.68
232.22	Lunch Room	3600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	1238.4	$204.34	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.28	20%	990.72	$163.47	$0.00	$450.00	0.07	247.68	$40.87	11.01
232.22	Café 212	3600	13	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.12	4024.8	$664.09	13	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.89	20%	3219.84	$531.27	$0.00	$450.00	0.22	804.96	$132.82	3.39
232.22	104 EMT Office	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.28	20%	715.52	$118.06	$0.00	$450.00	0.07	178.88	$29.52	15.25
232.22	103 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2683.2	$442.73	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.83	20%	2146.56	$354.18	$0.00	$450.00	0.21	536.64	$88.55	5.08
232.21	Men's Restroom	3000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	774	$127.71	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	619.2	$102.17	$0.00	$450.00	0.05	154.8	$25.54	17.62
232.21	Women's Restroom	3000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	774	$127.71	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	619.2	$102.17	$0.00	$450.00	0.05	154.8	$25.54	17.62
232.21	105 Office	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	0	No Change	86	0.17	0%	447.2	$73.79	$0.00	$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.22	Admin Side Offices (4)	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1788.8	$295.15	8	0	No Change	86	0.69	0%	1788.8	$295.15	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	109 Mail Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169	$27.89	1	0	No Change	65	0.07	0%	169	$27.89	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	109 Coffee Room	2600	1	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	161.2	$26.60	1	0	No Change	62	0.06	0%	161.2	$26.60	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Women's Restroom	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	223.6	$36.89	1	0	No Change	86	0.09	0%	223.6	$36.89	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Small Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	$167.31	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.31	20%	811.2	$133.85	$0.00	$450.00	0.08	202.8	$33.46	13.45
232.21	118 File Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.52	1341.6	$221.36	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.41	20%	1073.28	$177.09	$0.00	$450.00	0.10	268.32	$44.27	10.16
227.21	Hall	2600	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	845	$139.43	5	0	No Change	65	0.33	0%	845	$139.43	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	120 Storage	1200	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	206.4	$34.06	2	0	No Change	86	0.17	0%	206.4	$34.06	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	204 Storage	1200	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	309.6	$51.08	3	0	No Change	86	0.26	0%	309.6	$51.08	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	207 Storage	1200	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	412.8	$68.11	4	0	No Change	86	0.34	0%	412.8	$68.11	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Driver Training	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	$167.31	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.31	20%	811.2	$133.85	$0.00	$450.00	0.08	202.8	$33.46	13.45
227.21	208 Storage	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78	$12.87	1	0	No Change	65	0.07	0%	78	$12.87	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	202 Classroom	2600	21	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.81	4695.6	$774.77	21	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	1.44	20%	3756.48	$619.82	$0.00	$450.00	0.36	939.12	$154.95	2.90
232.22	301 Conference Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1341.6	$221.36	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.41	20%	1073.28	$177.09	$0.00	$450.00	0.10	268.32	$44.27	10.16
237.22		2600	4	3	2x2, 3 Lamp, 17w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	52	0.21	540.8	$89.23	4	0	No Change	52	0.21	0%	540.8	$89.23	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	302 Classroom	2600	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	3577.6	$590.30	16	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	1.10	20%	2862.08	$472.24	$0.00	$450.00	0.28	715.52	$118.06	3.81

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.21	Men's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	0	No Change	86	0.17	0%	447.2	$73.79	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169	$27.89	1	0	No Change	65	0.07	0%	169	$27.89	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Women's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$73.79	2	0	No Change	86	0.17	0%	447.2	$73.79	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169	$27.89	1	0	No Change	65	0.07	0%	169	$27.89	$0.00	$0.00	0.00	0	$0.00	0.00
221.41	314 Storage	1200	3	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	58	0.17	208.8	$34.45	3	0	No Change	58	0.17	0%	208.8	$34.45	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	313 Classroom	2600	24	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	2.06	5366.4	$885.46	24	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	1.65	20%	4293.12	$708.36	$0.00	$450.00	0.41	1073.28	$177.09	2.54
232.22	311 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2683.2	$442.73	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.83	20%	2146.56	$354.18	$0.00	$450.00	0.21	536.64	$88.55	5.08
232.22	310 Classroom	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2683.2	$442.73	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.83	20%	2146.56	$354.18	$0.00	$450.00	0.21	536.64	$88.55	5.08
232.22	309 A/V Room	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.28	20%	715.52	$118.06	$0.00	$450.00	0.07	178.88	$29.52	15.25
227.22	308 Conference Room	2600	12	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.70	1809.6	$298.58	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	58	0.56	20%	1447.68	$238.87	$0.00	$450.00	0.14	361.92	$59.72	7.54
232.22	306 Ready Room	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1341.6	$221.36	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.41	20%	1073.28	$177.09	$0.00	$450.00	0.10	268.32	$44.27	10.16
232.22	307 Office	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	670.8	$110.68	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.21	20%	536.64	$88.55	$300.00	$450.00	0.05	134.16	$22.14	20.33
232.22	305 Break Room	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$147.58	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	86	0.28	20%	715.52	$118.06	$300.00	$450.00	0.07	178.88	$29.52	15.25
222.21	Corridor	3600	16	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.99	3571.2	$589.25	16	0	No Change	62	0.99	0%	3571.2	$589.25	$0.00	$0.00	0.00	0	$0.00	0.00
237.22	Hall Of Heros	2600	102	3	2x2, 3 Lamp, 17w T8 Ulamp, Elect. Ballast, Recessed Mnt., Parabolic Lens	52	5.30	13790.4	$2,275.42	102	0	No Change	52	5.30	0%	13790.4	$2,275.42	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	202 Storage	1200	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	206.4	$34.06	2	0	No Change	86	0.17	0%	206.4	$34.06	$0.00	$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
560	Exterior	4400	6	1	Recessed Down Light, 26w CFL Lamp	26	0.16	686.4	$113.26	6	0	No Change	26	0.16	0%	686.4	$113.26	$0.00	$0.00	0.00	0	$0.00	0.00
713		4400	18	1	100w HPS 1x1 w/Prismatic Lens	125	2.25	9900	$1,633.50	18	0	No Change	125	2.25	0%	9900	$1,633.50	$0.00	$0.00	0.00	0	$0.00	0.00
725		4400	5	1	150w HPS Wallpack	188	0.94	4136	$682.44	5	0	No Change	188	0.94	0%	4136	$682.44	$0.00	$0.00	0.00	0	$0.00	0.00
711		4400	4	1	100w HPS Bollards	125	0.50	2200	$363.00	4	0	No Change	125	0.50	0%	2200	$363.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		597	171			44.9	132,201.0	$21,813	597	28			41.2		121,946.0	$20,121.08		$12,600	3.75	10,255	$1,692	7.45

Project Name: LGEA Solar PV Project - Law & Public Safety Institute
Location: Mahwah, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,761,570
Annual kWh Production	239,115
Annual Energy Cost Reduction	$35,867
Annual SREC Revenue	$83,690
First Cost Premium	**$1,761,570**
Simple Payback:	**14.73** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.150**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$1,761,570	0	0	0	$0	(1,761,570)	0
1	$0	239,115	$35,867	$0	$83,690	$119,558	($1,642,013)
2	$0	237,919	$36,943	$0	$83,272	$120,215	($1,521,797)
3	$0	236,730	$38,052	$0	$82,855	$120,907	($1,400,890)
4	$0	235,546	$39,193	$0	$82,441	$121,634	($1,279,256)
5	$0	234,368	$40,369	$2,414	$82,029	$119,984	($1,159,272)
6	$0	233,197	$41,580	$2,402	$81,619	$120,797	($1,038,475)
7	$0	232,031	$42,827	$2,390	$81,211	$121,648	($916,827)
8	$0	230,870	$44,112	$2,378	$80,805	$122,539	($794,288)
9	$0	229,716	$45,436	$2,366	$80,401	$123,470	($670,818)
10	$0	228,568	$46,799	$2,354	$79,999	$124,443	($546,375)
11	$0	227,425	$48,203	$2,342	$79,599	$125,459	($420,916)
12	$0	226,288	$49,649	$2,331	$79,201	$126,519	($294,398)
13	$0	225,156	$51,138	$2,319	$78,805	$127,624	($166,774)
14	$0	224,030	$52,672	$2,308	$78,411	$128,775	($37,999)
15	$0	222,910	$54,252	$2,296	$78,019	$129,975	$91,976
16	$0	221,796	$55,880	$2,284	$77,628	$131,224	$223,200
17	$0	220,687	$57,556	$2,273	$77,240	$132,524	$355,724
18	$0	219,583	$59,283	$2,262	$76,854	$133,876	$489,599
19	$0	218,485	$61,062	$2,250	$76,470	$135,281	$624,880
20	$0	217,393	$62,893	$2,239	$76,088	$136,742	$761,622
21	$1	216,306	$64,780	$2,228	$75,707	$138,259	$899,882
22	$2	215,224	$66,724	$2,217	$75,329	$139,835	$1,039,717
23	$3	214,148	$68,725	$2,206	$74,952	$141,472	$1,181,188
24	$4	213,078	$70,787	$2,195	$74,577	$143,170	$1,324,358
25	$5	212,012	$72,911	$2,184	$74,204	$144,931	$1,469,289
	Totals:	5,632,581	$1,307,694	$48,238	$1,971,403	$3,230,859	($3,428,664)
				Net Present Value (NPV)		**$1,469,314**	
				Internal Rate of Return (IRR)		**5.1%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Law & Public Safety Institute	13,900	Sunpower SPR230	851	14.7	12,513	195.73	239,115	28,083	15.64

.= Proposed PV Layout

Notes:

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

PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	195.7 kW
DC to AC Derate Factor:	0.810
AC Rating:	158.5 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	11.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	2.58	12714	1423.97
2	3.33	15013	1681.46
3	4.31	20967	2348.30
4	5.20	23883	2674.90
5	5.85	27277	3055.02
6	6.14	26550	2973.60
7	6.06	26821	3003.95
8	5.54	24648	2760.58
9	4.85	21193	2373.62
10	3.76	17305	1938.16
11	2.65	12125	1358.00
12	2.23	10618	1189.22
Year	4.38	239115	26780.88

Output Hourly Performance Data

About the Hourly Performance Data

Output Results as Text

Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

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Solar Thermal Calculations

Concord Engineering Group

Bergen County - Law and Public Safety Institute

SOLAR THERMAL SYSTEM CALCULATIONS (FLAT PLATE COLLECTORS)

Solar Thermal Panel SF:	800
Solar Panel Qty:	17
Panel Direction:	180° (South)
Tilt Angle (degree from horizontal):	40.7°
Ave Solar Thermal Operating Temperature:	90
Panel Area (SF per panel):	48

*Solar Panel Efficiencies are based on Viesmann Flat Plate collector model VITOSOL 200F

Month	AMB T	AVE ΔT	SOLAR RADIATION			DHW PRODUCTION		
	(°F)	(°F)	KWH/M^2/Day	KWH/SF/Day	Panel Eff.	Net KWH/SF/Day	Net KWH	Net kBtu
1	30	60	3.36	0.312	41.0%	0.128	3,116	10,639
2	30	60	4.05	0.376	41.0%	0.154	3,756	12,824
3	40	50	4.58	0.425	46.7%	0.199	4,835	16,507
4	50	40	4.84	0.450	52.3%	0.235	5,730	19,562
5	60	30	5.3	0.492	58.0%	0.286	6,954	23,741
6	70	20	5.33	0.495	63.7%	0.315	7,677	26,208
7	80	10	5.27	0.490	69.3%	0.339	8,266	28,219
8	85	5	5.25	0.488	72.2%	0.352	8,571	29,261
9	75	15	5.06	0.470	66.5%	0.313	7,612	25,988
10	65	25	4.46	0.414	60.8%	0.252	6,138	20,954
11	50	40	3.15	0.293	52.3%	0.153	3,729	12,732
12	40	50	2.87	0.267	46.7%	0.124	3,030	10,344
TOTALS							**69,414**	**236,979**
AVERAGE			**4.46**	**0.414**		**0.238**	**5,784**	**19,748**

Notes: Solar radiation values obtained from National Renewable Energy Laboratory PVWatts Version 1 Calculator Program

Solar Thermal System Panel Layout

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Average kWh (heat)	Total Annual kWh (heat)	Average kBtu (heat)	Total Annual kBtu (heat)
Law and Public Safety Insitute	800	Viesmann Flat Plate (VITOSOL 200F)	17	48.0	816	5,784	69,414	19,748	236,979

.= Proposed Solar Thermal Layout

Notes:

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