

SUSSEX COUNTY

ADMINISTRATIVE CENTER

**ONE SPRING STREET
NEWTON, NJ 07860**

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:	Jersey Central Power & Lighting (JCP&L)
Electric Utility Rate Structure:	General Service Secondary 3- Phase
Third Party Supplier:	N/A

Natural Gas Utility Provider:	Elizabethtown Gas
Utility Rate Structure:	General Delivery - Heat
Third Party Supplier:	Hess

Water Utility Provider:	Newton Water & Sewer Utility
Utility Rate Structure:	N/A
Third Party Supplier:	None

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

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

The water usage profile for this facility shows the actual water consumption based on collected utility bills. The water utility typically measures consumption in gallons (gal), and converts the quantity into 1,000 gallons.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider: JCP&L Rate: General Service Secondary 3-Phase Meter No: L86699274 Account No: 100 034 052 421 Third Party Utility Provider: N/A TPS Meter / Acct No: N/A			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Jan-12	44,160	122.9	\$6,727
Feb-12	46,880	104.2	\$6,977
Mar-12	48,480	129.1	\$7,205
Apr-12	57,120	161.9	\$8,508
May-12	56,000	151.7	\$8,297
Jun-12	71,040	187.4	\$10,189
Jul-12	69,120	187.4	\$9,818
Aug-12	75,520	173.3	\$10,509
Sep-12	62,560	164.6	\$8,622
Oct-12	54,720	142.6	\$7,361
Nov-12	48,960	120.0	\$6,537
Dec-12	49,760	120.6	\$6,901
Totals	684,320	187.4 Max	\$97,651
AVERAGE DEMAND 149.6 KW average AVERAGE RATE \$0.143 \$/kWh			

Figure 1
Electricity Usage Profile

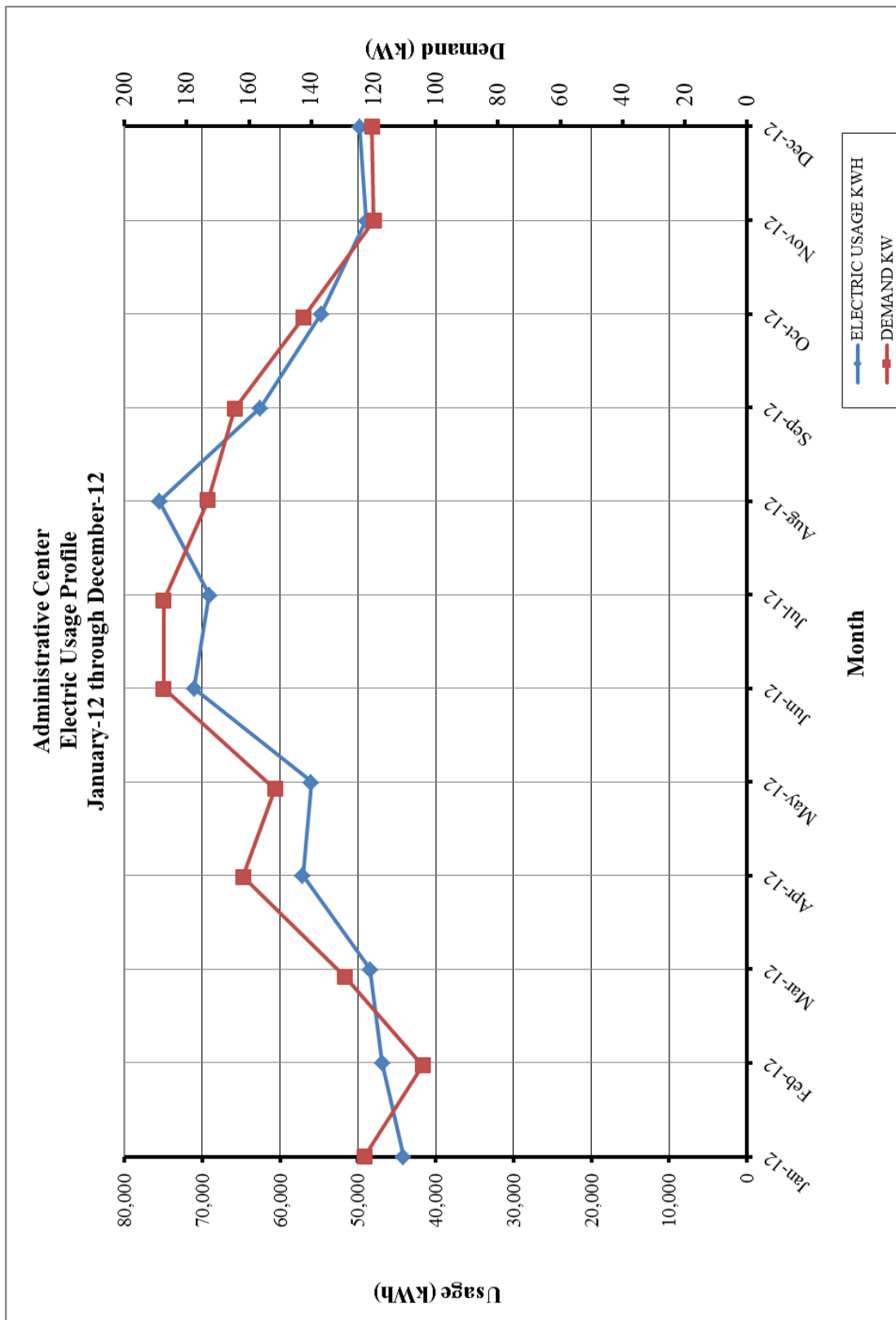


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: Elizabethtown Gas Rate: General Delivery - Heat Meter No: 05601440; 01055959 Account No: 8659911581; 7390021581 Third Party Utility Provider: Hess TPS Meter No: -		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-12	2,467.20	\$2,283.42
Feb-12	2,570.80	\$2,220.25
Mar-12	1,239.80	\$1,126.80
Apr-12	1,275.20	\$1,134.19
May-12	705.20	\$713.58
Jun-12	354.40	\$471.79
Jul-12	65.70	\$254.28
Aug-12	139.90	\$304.86
Sep-12	626.00	\$625.79
Oct-12	945.90	\$903.89
Nov-12	1,994.40	\$1,830.27
Dec-12	2,203.50	\$2,032.68
TOTALS	14,588.00	\$13,901.80
AVERAGE RATE:	\$0.95	\$/THERM

Figure 2
Natural Gas Usage Profile

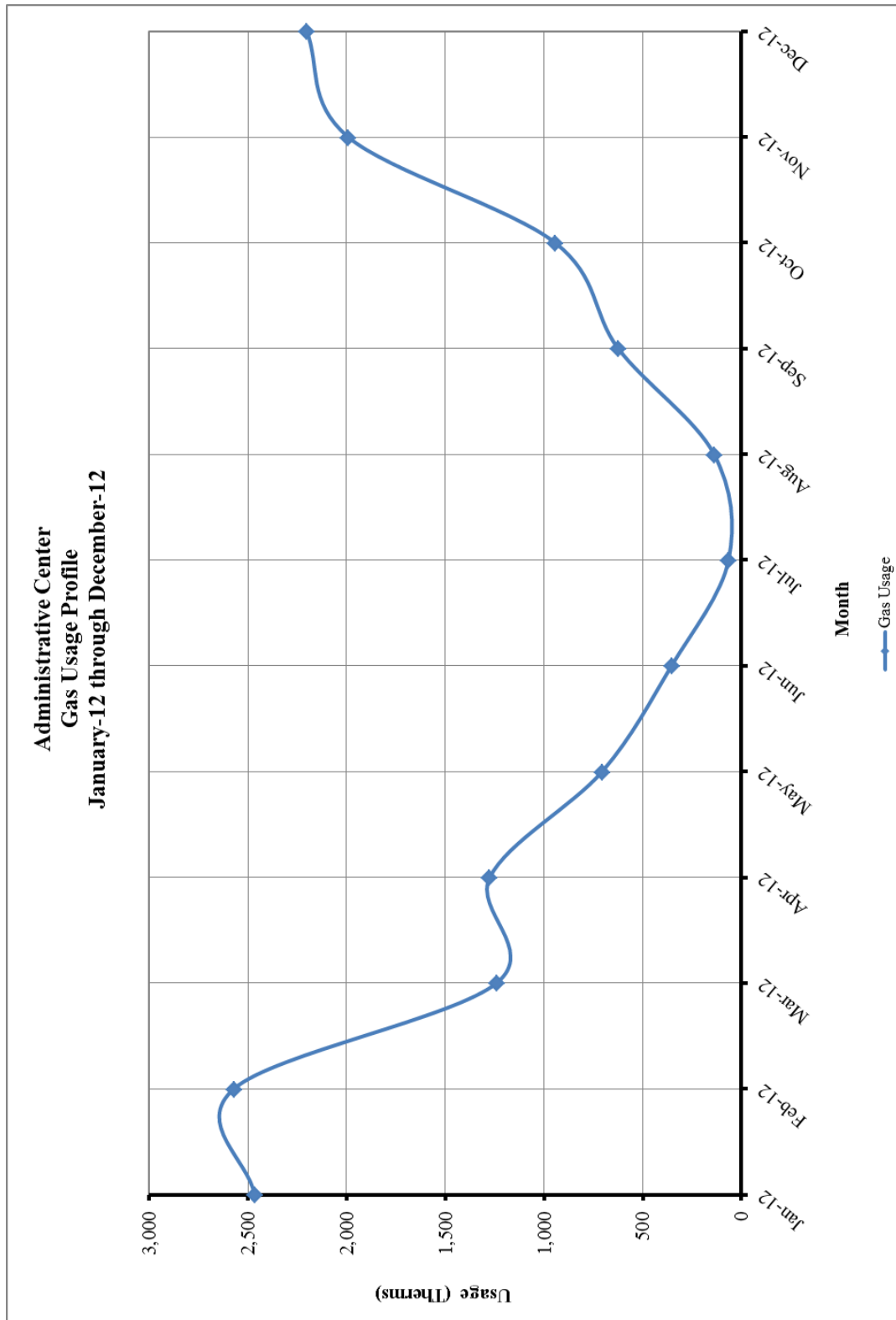
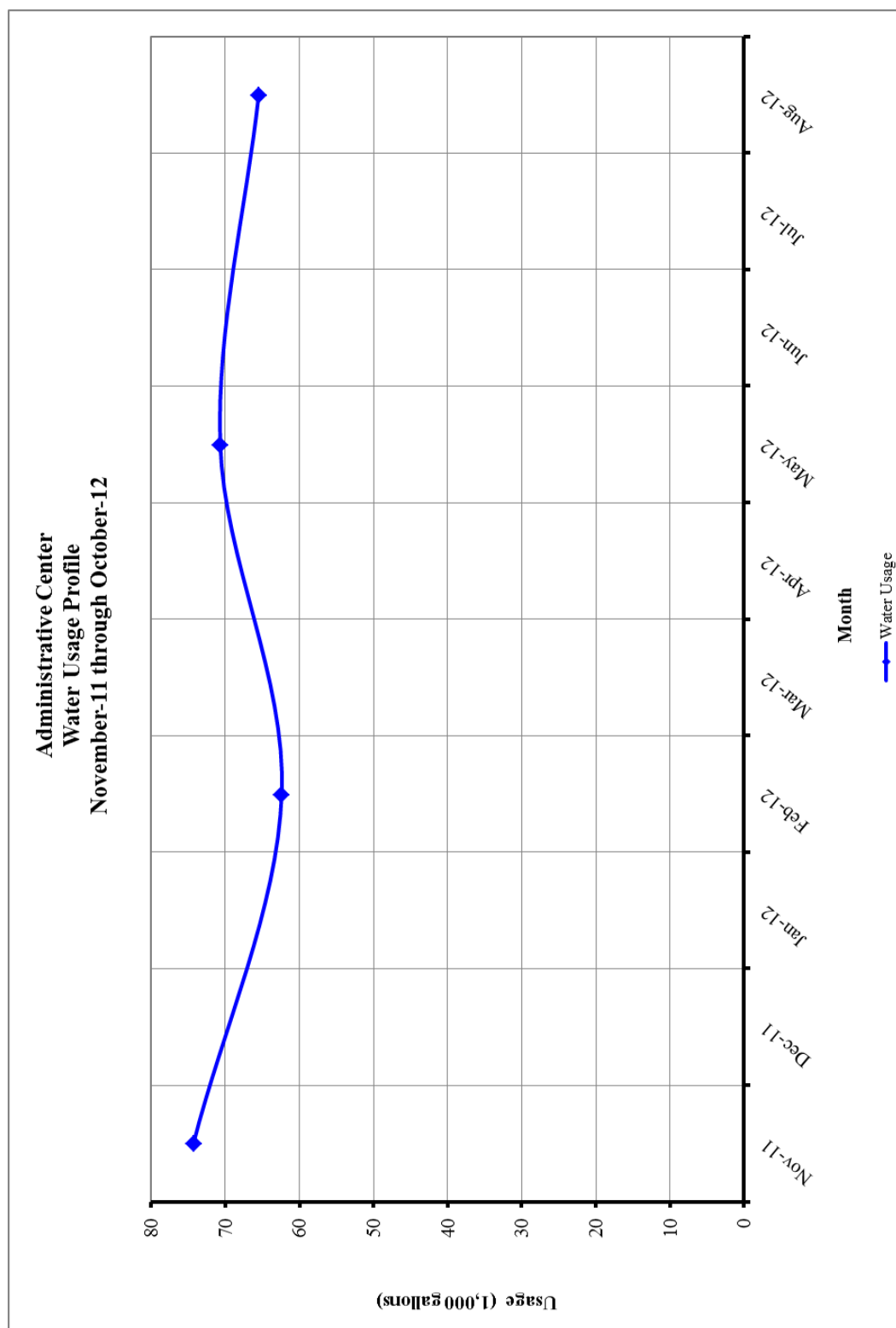


Table 3
Water Billing Data

WATER USAGE SUMMARY		
Utility Provider: Newton Water & Sewer Utility Meter No: 1396 / 1406		
MONTH OF USE	CONSUMPTION (1,000 GALLONS)	TOTAL BILL
Nov-11 to Jan-12	74.30	\$1,277.10
Feb-12 to Apr-12	62.40	\$1,074.80
May-12 to July-12	70.70	\$1,215.90
Aug-12 to Oct-12	65.50	\$1,927.50
TOTALS	272.90	\$5,495.30
AVERAGE RATE:	\$20.14	\$/1000 GAL

Figure 3
Water Usage Profile



II. FACILITY DESCRIPTION

The Administrative Center is located at 1 Spring Street in Newton, New Jersey. This 35,000 SF facility was built in 1988 with no additions. The building is a three story facility with a ground level garage area. The facility is mostly comprised of offices and open office space, conference rooms, file storage and mechanical HVAC spaces.

Occupancy Profile

The typical hours of operation for most of the facility are Monday through Friday between 6:30 am and 5:30 pm. There are approximately 90 employees that normally occupy the facility.

Building Envelope

Exterior walls for the building are masonry brick faced with a concrete block construction. The windows throughout the facility are in very good condition. Typical windows are double pane, 1/4" with aluminum frames. The roof construction is corrugated steel with insul-board and EPDM roofing.

HVAC Systems

The Administrative Center is conditioned by a combination of hot water baseboard heat and packaged rooftop units that serve variable air volume (VAV) devices with hot water reheat. Hot water is supplied to the perimeter baseboard and hot water reheat coils by three (3) Caravan Slant fin boilers and one (1) Hydro Therm boiler. The Caravan Slant fins boilers are rated at 300 MBH input and 240 MBH output with an estimated efficiency of 80% based on the age and condition of the units. The Hydro Therm boiler is rated at 900 MBH input and 720 MBH output with an estimated efficiency of 75% based on the age and condition of the unit. The Caravan boilers provide hot water to baseboard and reheat on the first floor south, 2nd floor and 3rd floor while the Hydro Therm boiler provides hot water to the north side of the first floor.

Heating hot water is circulated to various hot water coils and fin-tube radiators via 4 in-line ceiling hung pumps in the boiler room. Two pumps are ¾ HP, Bell & Gossett Series 60 and the other two pumps are (1) 3 HP and (1) 2 HP, Bell & Gossett pumps. Most areas are heated by Carrier VAV boxes with hot water coils or hot water duct coils and most of the perimeter walls are heated by hot water baseboard heaters. The restrooms have electric cabinet heaters.

Cooling for the Administrative Center is provided by three packaged rooftop units. The first unit is manufactured by Carrier, has a total cooling capacity of 40 tons, was installed in 1999 and primarily conditions the 1st floor. This Carrier unit has electric heating coils within the unit for pre-conditioning. The other two units are 30 ton Trane rooftop units, installed in 2010 and do not contain any pre-conditioning options.

Exhaust System

There are two large exhaust fans on the roof that are used for smoke evacuation.

Toilet exhaust air is relieved through roof mounted goose-necks.

HVAC System Controls

The heating and cooling is controlled by various standalone thermostats throughout the facility.

The Caravan Slant Fin boilers are controlled by a Tekmar boiler controller.

The Hydro-Therm boiler is controlled by a Hydro-Therm boiler control panel.

Additionally, there is a Carrier VVT system which controls the VAV units. The VVT system is designed to control each zone of VAV's that are associated with the rooftop units and the VAV's operate based on a zone average temperature. This VVT system does not integrate with the new Trane packaged units on the roof. The Trane packaged rooftop units contain standalone thermostat controls within each space they condition and are based upon discharge air temperature sensors.

Domestic Hot Water

The 2nd and 3rd floor restrooms are provided domestic hot water by (2) low boy electric domestic hot water heaters. The heater on the third floor is above the ceiling and the unit tag was oriented in a manner that information could not be obtained. The second floor heater is an A.O. Smith 10 gallon electric water heater rated at 1500 watts. The first floor restrooms contain tank-less electric water heaters manufactured by Eemax Inc., rated at 4.1 kW.

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 4
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	General Lighting Upgrade	\$49,950	\$8,554	5.8	156.9%
ECM #2	Lighting Controls Upgrade	\$2,865	\$1,249	2.3	553.9%
ECM #3	Exterior Lighting Upgrade	\$180	\$385	0.5	3108.3%
ECM #4	RTU-1 Replacement	\$192,630	\$5,180	37.2	-59.7%
ECM #5	Demand Control Ventilation	\$67,500	\$647	104.3	-85.6%
ECM #6	Vending Miser Controls	\$2,250	\$661	3.4	193.6%
ECM #7	DDC Controls Upgrade	\$150,000	\$3,691	40.6	-63.1%
ECM #8	Variable Frequency Drive Supply Fans	\$18,078	\$3,034	6.0	151.7%
ECM #9	Water Conservation	\$565	\$3,949	0.1	6889.4%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	19.2 kW PV System	\$91,655	\$6,534	14.0	6.9%

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

B. Savings takes into consideration applicable maintenance savings.

Table 5
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION			
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)	WATER (GALLONS)
ECM #1	General Lighting Upgrade	17.0	59,818	0	0
ECM #2	Lighting Controls Upgrade	0.0	8,738	0	0
ECM #3	Exterior Lighting Upgrade	0.6	2,693	0	0
ECM #4	RTU-1 Replacement	0.0	36,221	0	0
ECM #5	Demand Control Ventilation	0.0	487	611	0
ECM #6	Vending Miser Controls	0.0	4,619	0	0
ECM #7	DDC Controls Upgrade	0.0	8,450	671	0
ECM #8	Variable Frequency Drive Supply Fans	7.3	21,215	0	0
ECM #9	Water Conservation	0.0	10,558	0	121,125
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION			
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)	WATER (GALLONS)
REM #1	19.2 kW PV System	19.2	22,187	0	0

Table 6
ECM Emissions Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	GREENHOUSE GAS EMISSIONS REDUCTION		
		CO₂ EMISSIONS (LBS)	NO_x EMISSIONS (LBS)	SO₂ EMISSIONS (LBS)
ECM #1	General Lighting Upgrade	90,923	167	389
ECM #2	Lighting Controls Upgrade	13,282	24	57
ECM #3	Exterior Lighting Upgrade	4,093	8	18
ECM #4	RTU-1 Replacement	55,056	101	235
ECM #5	Demand Control Ventilation	7,889	7	3
ECM #6	Vending Miser Controls	7,021	13	30
ECM #7	DDC Controls Upgrade	20,695	30	55
ECM #8	Variable Frequency Drive Supply Fans	32,247	59	138
ECM #9	Water Conservation	16,048	30	69
Notes: A. Emissions Reduction based on NJCEP published factors for electric & gas.				

Table 7
Facility Project Summary

FACILITY PROJECT SUMMARY TABLE					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
General Lighting Upgrade	\$8,554	\$50,080	\$130	\$49,950	5.8
Lighting Controls Upgrade	\$1,249	\$3,350	\$485	\$2,865	2.3
Exterior Lighting Upgrade	\$385	\$240	\$60	\$180	0.5
RTU-1 Replacement	\$5,180	\$195,000	\$2,370	\$192,630	37.2
Demand Control Ventilation	\$647	\$67,500	\$0	\$67,500	104.3
Vending Miser Controls	\$661	\$2,250	\$0	\$2,250	3.4
DDC Controls Upgrade	\$3,691	\$150,000	\$0	\$150,000	40.6
Variable Frequency Drive Supply Fans	\$3,034	\$20,478	\$2,400	\$18,078	6.0
Water Conservation	\$3,949	\$565	\$0	\$565	0.1
Total Project	\$27,349	\$489,463	\$5,445	\$484,018	17.7

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

The facility peak electrical demand and total project savings meet the qualifications for the Pay for Performance Program. If the owner were to pursue this program option they could receive an estimated \$38474.66 in incentive dollars, see the Installation Funding Options Section for more detail.

ECM #1: Lighting Upgrade – General

Description:

The majority of the interior lighting throughout Sussex County Administrative Center is provided with fluorescent fixtures with older generation, 32W T8 lamps and electronic ballasts as well as 34W T12 lamps and magnetic ballasts. In addition to the fluorescent tube lamps there are additional fixture types consisting of incandescent lamps. These can be retrofitted to LED style lamps.

This ECM includes retrofitting the interior lighting with new LED type lamps and fixtures. It is recommended the County consult with a professional engineer prior to retrofitting fixtures to ensure code required minimum light levels will be met.

Energy Savings Calculations:

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

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	17.0
Electric Usage Savings (kWh)	59,818
Electric Cost Savings (\$)	\$8,554

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$50,080
NJ Smart Start Equipment Incentive (\$):	\$130
Net Installation Cost (\$):	\$49,950
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$8,554
Total Yearly Savings (\$/Yr):	\$8,554
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.8
Simple Lifetime ROI	156.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$128,310
Internal Rate of Return (IRR)	15%
Net Present Value (NPV)	\$52,167.10

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Sussex County Administrative Center 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.

This ECM includes installation of ceiling or switch mount sensors in most of the offices. 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:

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

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

LIGHTING CONTROLS SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	0.0
Electric Usage Savings (kWh)	8,738
Electric Cost Savings (\$)	\$1,249

Rebates and Incentives:

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

Smart Start Incentive

$$= (\# \text{ Wall mount sensors} \times \$20 \text{ per sensor}) \\ + (\# \text{ Ceiling mount sensors} \times \$35 \text{ per sensor})$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,350
NJ Smart Start Equipment Incentive (\$):	\$485
Net Installation Cost (\$):	\$2,865
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,249
Total Yearly Savings (\$/Yr):	\$1,249
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.3
Simple Lifetime ROI	553.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$18,735
Internal Rate of Return (IRR)	43%
Net Present Value (NPV)	\$12,045.48

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at Sussex County Administrative Center is currently lit by metal halide fixtures. The exterior would be better served with more efficient LED lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient LED lighting system that includes LED lamps and fixtures for the existing exterior lighting.

This ECM would replace six (6) of the existing exterior lamps and fixtures with equivalent LED lamps and fixtures.

Energy Savings Calculations:

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

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	0.6
Electric Usage Savings (kWh)	2,693
Electric Cost Savings (\$)	\$385

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$240
NJ Smart Start Equipment Incentive (\$):	\$60
Net Installation Cost (\$):	\$180
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$385
Total Yearly Savings (\$/Yr):	\$385
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.5
Simple Lifetime ROI	3108.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$5,775
Internal Rate of Return (IRR)	214%
Net Present Value (NPV)	\$4,416.11

ECM #4: Rooftop Replacement

Description:

The Sussex County Administrative Center has one older packaged rooftop unit which serves the first floor. The existing Carrier unit has reached its ASHRAE service life and should be replaced with a newer more efficient rooftop unit.

This ECM includes installation of one high efficiency rooftop unit with variable frequency drive on the supply that will modulate the supply air for the first floor. The manufacturer used as the basis for the calculation is Trane. The unit pricing and install cost were estimated based on dealer rates quotes and labor rates. The payback may change based on actual unit pricing and install costs if the ECM is implemented.

Note: Concord Engineering recommends a full engineering evaluation on the existing and future HVAC systems. This ECM requires a full evaluation of the feasibility for the new HVAC design.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.8.3, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by the owner regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

ENERGY MODEL SAVINGS	
DESCRIPTION	SAVINGS
Electric demand Savings (kW)	16
Electric Usage Savings (kWh)	36,221
Natural Gas Usage Savings (Therms)	0
Total Cost Savings (\$)	\$5,180

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$195,000
NJ Smart Start Equipment Incentive (\$):	\$2,370
Net Installation Cost (\$):	\$192,630
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$5,180
Total Yearly Savings (\$/Yr):	\$5,180
Estimated ECM Lifetime (Yr):	15
Simple Payback	37.2
Simple Lifetime ROI	-59.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$77,694
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	(\$130,796.24)

ECM #5: Demand Controlled Ventilation

Description:

The Sussex County Administrative Center rooftop units were identified as good candidates for the installation of Demand Controlled Ventilation (DCV) given their varied occupancy levels throughout the day. There are currently three rooftop units that serve the facility with direct expansion coils and electric heat back-up. Demand Controlled Ventilation (DCV) is a means to provide active, zone level control of ventilation for spaces within a facility. The basic premise behind DCV is monitoring indoor CO₂ levels versus outdoor CO₂ levels in order to provide proper ventilation to the spaces within the facility as well as saving costly dollars treating unconditioned ventilation air. Carbon dioxide ventilation control or demand controlled ventilation (DCV) allows for the measurement and control of outside air ventilation levels to a target cfm/person ventilation rate in the space (i.e., 15 cfm/person) based on the number of people in the space. It is a direct measure of ventilation effectiveness and is a method whereby buildings can regain active and automatic zone level ventilation control, without having to open windows. The fixed ventilation approach depends on a set-it-and-forget-it methodology that is completely unresponsive to changes in the way spaces are utilized/occupied or how equipment is maintained. A DCV system utilizes various control algorithms to maintain a base ventilation rate. The system monitors space CO₂ levels and the algorithm automatically adjusts the outdoor and return air dampers to provide the quantity of outdoor air to maintain the required CO₂ level in the space. System designs are normally designed for maximum occupancy and the ventilation rates are designed for this (maximum) occupancy. In areas where occupancy swings are prevalent there is ample opportunity to reduce outdoor air quantity to satisfy the needs of the actual number of occupants present. By installing the DCV controls, energy savings are realized by the reduced quantities of outdoor air that do not require heating and cooling energy from the steam and chilled water plants.

This ECM includes the installation of CO₂ sensors integrated into a demand control ventilation system, for the three rooftop units. This system allows the rooftop units to respond to changes in occupancy and therefore reduce the amount of outside air that has to be conditioned. Outside air accounts for a large portion of the energy consumption in the HVAC system, especially in high occupancy spaces. 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.

Energy Savings Calculations:

Savings Calculations were calculated utilizing energy modeling software, Trane Trace 700 version 6.2.8.3, to compare the existing conditions to the alternative energy conservation measure. The model was built using existing information collected and provided by the owner regarding lighting power density, occupancy profiles, HVAC information, and available floor plans.

ENERGY MODEL SAVINGS	
DESCRIPTION	SAVINGS
Electric demand Savings (kW)	3
Electric Usage Savings (kWh)	467
Natural Gas Usage Savings (Therms)	611
Total Cost Savings (\$)	\$647

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$67,500
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$67,500
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$647
Total Yearly Savings (\$/Yr):	\$647
Estimated ECM Lifetime (Yr):	15
Simple Payback	104.3
Simple Lifetime ROI	-85.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$9,705
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	(\$59,776.16)

ECM #6: Vending Miser Controls

Description:

The Sussex County Administrative Center currently utilizes cold beverage and snack vending machines. Vending machines are usually used for a limited time during the day. The installation of the Vending Miser system will help reduce the operating hours of the vending machines.

Cold beverage machines regularly operate inefficiently trying to maintain a constant cool temperature within the machine and snack machines with no cooling usually have lights that operate 24/7. The VendingMiser® system incorporates innovative energy-saving technology into a small plug-and-play device that in conjunction with a passive infrared sensor regulate the operation of the cold beverage and snack machines based on occupancy. The device also monitors the room's temperature and automatically re-powers the cooling system in the beverage machine to ensure that the product stays cold. For the cold beverage machines, the controllers will never power down the machine while the compressor is running so as to prevent compressor short-cycling. The cooling cycle is allowed to finish before powering down the compressor.

This ECM would install six (6) of these control systems, three (3) for the snack machines and three (3) for the cold beverage machines.

Energy Savings Calculations:

Cold Drink and Snack Vending Machine Energy Conservation Project					
		Input Variables			
Energy Analysis Prepared For:	Energy Costs (\$0.000 per kwh)			\$0.143	
	Facility Occupied Hours per Week			60	
Sussex Administrative Center	Number of Cold Drink Vending Machines			3	
	Number of Uncooled Snack Machines			3	
www.VendingMiserStore.com	Power Requirements of Cold Drink Machine (avg watts)			233	
	Power Requirements of Snack Machine (avg watts)			80	
	VendingMiser Sale Price (for cold drink machines)			\$500.00	
	OfficeMiser Sale Price (for snack machines)			\$250.00	
Savings Analysis					
	Before	After			
Cold Drink Machines	\$876.22	\$408.42	Cost of Operation		
	6,127	2,856	kWh		
		53%	% Energy Savings		
Snack Machines	\$299.82	\$107.08	Cost of Operation		
	2,097	749	kWh		
		64%	% Energy Savings		
Project Summary					
Present kWh	Projected kWh	kWh Savings per Year			
8,224	3,605	4,619			
Present Cost	Projected Costs	Annual Savings	Per Cent Savings	Total Project Cost	Break Even (Months)
\$1,176.04	\$515.50	\$660.54	56%	\$2,250.00	40.9

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,250
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$2,250
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$661
Total Yearly Savings (\$/Yr):	\$661
Estimated ECM Lifetime (Yr):	10
Simple Payback	3.4
Simple Lifetime ROI	193.6%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$6,605
Internal Rate of Return (IRR)	27%
Net Present Value (NPV)	\$3,384.54

ECM #7: Digital Energy Management System (BMS) Upgrades

Description:

Currently the Sussex County Administrative Center only contains a stand-alone boiler controller for the boilers and local controls for the split systems and rooftop units. Upgrading their current system would allow Sussex County to save significant energy. This BMS includes such features as night setback, scheduling equipment, changing set-points, viewing status of the building, space temperatures, optimal start/stop, building pre-cooling, etc.

Concord Engineering recommends integrating a controls system with the latest operating platform featuring boiler plant optimization, outside air reset, supply air temperature reset, etc.

This ECM includes installation of a Building Automation system to include control of the HVAC equipment in the facility. The system will include new rooftop unit controls, new thermostats, new unit VAV/baseboard control valves, a front end computer and main controller. With the communication between the control devices and the front end computer interface, the facility manager will be able to take advantage of scheduling for occupied and unoccupied periods based on the actual occupancy of each space in the facility. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

The Central DDC system installation has the potential to provide significant savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, etc. The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the “Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways,” document posted for public use April 2005. The study has found that 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 referenced report:

- Energy Management and Control System Savings: 5%-15%.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the electricity and 10% for the gas utility in this building. (Note: There are currently no NJ OCE incentives for HVAC controls upgrades.)

Energy Savings Calculations:

The following table summarizes energy savings for this facility via implementation of a Building Management System:

CONTROLS SAVINGS CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
HVAC Usage Electric (kBtu)	576,636	518,972	57,664
HVAC Usage Gas (kBtu)	1,341,014	1,206,912	134,101
Savings Percentage	-	10.0%	
Electric Site Conversion (kWh/kBtu)	3.412	3.412	
Gas Site Conversion (Therm/kBtu)	100.0	100.0	
Electric Cost (\$/kWh)	\$0.143	\$0.143	
Gas Cost (\$/Gallon)	\$0.950	\$0.950	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	169,002	152,102	16,900
Gas Usage (Therms)	13,410	12,069	1,341
Energy Cost (\$)	\$36,907	\$33,216	\$3,691
COMMENTS:			

Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by improved control of temperatures and optimization of the equipment via the upgraded DDC system.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$150,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$150,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,691
Total Yearly Savings (\$/Yr):	\$3,691
Estimated ECM Lifetime (Yr):	15
Simple Payback	40.6
Simple Lifetime ROI	-63.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$55,365
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	(\$105,937.08)

ECM #8: Variable Frequency Drive Supply Fans

Description:

The two Trane rooftop units at the Sussex County Administrative Center are not fitted with variable speed drives and continually operate at a constant speed with a bypass installed to operate the VAV's within the system. These units are capable of variable air volume and would significantly benefit from the installation of a VFD and static pressure sensor. By installation VFD's on these units the county will be able to better balance the system air flows as well as operate at a reduced horsepower based on the fan curve required power.

This ECM would install a variable frequency drive controller and duct mounted static pressure sensor. The scope of work will also require demolition of the existing bypass ductwork.

Energy Savings Calculations:

Energy Savings were calculated utilizing the New Jersey Board of Public Utilities Protocols to Measure Resource Savings dated July 2011.

$$\text{Energy Savings (kWh)} = 0.746 \times \text{HP} \times \text{HRS} \times (\text{ESF}/\eta_{\text{motor}})$$

$$\text{Demand Savings (kW)} = 0.746 \times \text{HP} \times (\text{DSF}/\eta_{\text{motor}})$$

$$\text{Energy Savings Factor (ESF)} = 0.475 \text{ (Airfoil/Backward Inclined Fans)}$$

$$\text{Demand Savings Factor (DSF)} = 0.448 \text{ (Airfoil/Backward Inclined Fans)}$$

VARIABLE SPEED DRIVE SAVINGS CALCULATIONS									
EQMT ID	QTY	FUNCTION	MOTOR HP	HOURS OF OPERATION	PROPOSED EFFICIENCY	INSTALL VFD	DEMAND SAVINGS (KW)	ENERGY SAVINGS (KWH)	ENERGY COST SAVINGS
RTU-1	1	Supply Fan	10	2,745	91.7%	Yes	3.6	10,607	\$1,517
RTU-2	1	Supply Fan	10	2,745	91.7%	Yes	3.6	10,607	\$1,517
TOTAL	2						7.3	21,215	\$3,034

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$20,478
NJ Smart Start Equipment Incentive (\$):	\$2,400
Net Installation Cost (\$):	\$18,078
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,034
Total Yearly Savings (\$/Yr):	\$3,034
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.0
Simple Lifetime ROI	151.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$45,510
Internal Rate of Return (IRR)	15%
Net Present Value (NPV)	\$18,142.10

ECM #9: Water Conservation

Description:

The facility utilizes standard plumbing fixtures. The typical sink aerator consumption is 2.2 gallons per minute. New fixtures and aerators are available that use less water that can add up to significant water reduction over a long period.

This ECM includes the replacement of the existing sink aerators with low flow sink aerators in the restrooms rated at 0.5 GPM. The existing quantity of sink estimated is based off observed quantity in the field and available drawings.

Energy Savings Calculations:

Faucets:

$$\text{Water Consumption} = \text{Occupancy} \left(\frac{\text{Days}}{\text{Yr}} \right) \times \text{Use} \left(\frac{\text{min}}{\text{Day}} \right) \times \text{Fixture Quantity} \times \text{Fixture} \left(\frac{\text{Gal}}{\text{Min}} \right)$$

$$\text{Water Cost} = \frac{\text{Water Consumption (Gallons)} \times \text{Ave Cost} \left(\frac{\$}{1000 \text{ Gal}} \right)}{1000(\text{Gal})}$$

Water Heating Usage (kWh)

$$= \frac{\text{Gallons}}{\text{year}} \times 8.33 \frac{\text{Btu}}{\text{gal}} \times \Delta T (50^\circ\text{F}) \times \frac{1}{\text{Heater Eff (95\%)}} \times \frac{\text{kW}}{3412 \text{ Btu}}$$

Water Heating Usage (therm)

$$= \frac{\text{Gallons}}{\text{year}} \times 8.33 \frac{\text{Btu}}{\text{gal}} \times \Delta T (50^\circ\text{F}) \times \frac{1}{\text{Heater Eff (80\%)}} \times \frac{\text{therm}}{100,000 \text{ Btu}}$$

LOW FLOW WATER SAVING DEVICES			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Quantity of Sinks	19	19	
Flow Rate (GPM)	2.2	0.5	1.7
Device Usage (min per day)	15	15	
Facility Operation (days / year)	250	250	
Heat Content of Water (Btu/gal/°F)	8.33	8.33	
Temperature Rise (°F)	70.0	70.0	
Efficiency of Heating System (%)	98%	98%	
Conversion Factor for Electric	3413	3413	
Electric Rate (\$/kWh)	\$0.143	\$0.143	
Water Rate (\$/1000gal)	\$20.140	\$20.140	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	13,663	3,105	10,558
Water Usage (gallons)	156,750	35,625	121,125
Energy Cost (\$)	\$5,111	\$1,162	\$3,949
COMMENTS:	Heating Savings based on 50% Hot Cold Mix		

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$565
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$565
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,949
Total Yearly Savings (\$/Yr):	\$3,949
Estimated ECM Lifetime (Yr):	10
Simple Payback	0.1
Simple Lifetime ROI	6889.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$39,490
Internal Rate of Return (IRR)	699%
Net Present Value (NPV)	\$33,120.77

REM #1: 19.2 kW Solar System**Description:**

The Sussex County Administrative Center has available roof space that could accommodate solar arrays. Based on the available area a 19.2 kilowatt solar array could be installed. The array will produce approximately 22,187 kilowatt-hours annually that will reduce the overall electric usage of the facility by 3.24%. The owner should consult a structural engineer prior to installing any solar array to insure the roof can accommodate the additional weight.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas. Financial results in table below are based on 100% financing of the system over a fifteen year period.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$91,655
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$91,655
Solar Renewable Energy Certificate (\$/Yr):	\$3,361
Energy Savings (\$/Yr):	\$3,173
Total Yearly Savings (\$/Yr):	\$6,534
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.0
Simple Lifetime ROI	6.9%
Simple Lifetime Maintenance Savings	\$50,421
Simple Lifetime Savings	\$98,012
Internal Rate of Return (IRR)	0.9%
Net Present Value (NPV)	(\$13,650.46)

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

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Sussex County Department of Shared Services - Administrative Center

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	General Lighting Upgrade	\$24,730	\$25,350	\$130	\$49,950	\$8,554	\$0	\$8,554	15	\$128,310	\$0	156.9%	5.8	15.03%	\$52,167.10
ECM #2	Lighting Controls Upgrade	\$2,200	\$1,150	\$485	\$2,865	\$1,249	\$0	\$1,249	15	\$18,735	\$0	553.9%	2.3	43.40%	\$12,045.48
ECM #3	Exterior Lighting Upgrade	\$120	\$120	\$60	\$180	\$385	\$0	\$385	15	\$5,775	\$0	3108.3%	0.5	213.89%	\$4,416.11
ECM #4	RTU-1 Replacement	\$50,000	\$145,000	\$2,370	\$192,630	\$5,180	\$0	\$5,180	15	\$77,694	\$0	-59.7%	37.2	-9.67%	(\$130,796.24)
ECM #5	Demand Control Ventilation	\$24,500	\$43,000	\$0	\$67,500	\$647	\$0	\$647	15	\$9,705	\$0	-85.6%	104.3	-18.06%	(\$59,776.16)
ECM #6	Vending Miser Controls	\$2,000	\$250	\$0	\$2,250	\$661	\$0	\$661	10	\$6,605	\$0	193.6%	3.4	26.58%	\$3,384.54
ECM #7	DDC Controls Upgrade	\$100,000	\$50,000	\$0	\$150,000	\$3,691	\$0	\$3,691	15	\$55,365	\$0	-63.1%	40.6	-10.47%	(\$105,937.08)
ECM #8	Variable Frequency Drive Supply Fans	\$8,200	\$12,278	\$2,400	\$18,078	\$3,034	\$0	\$3,034	15	\$45,510	\$0	151.7%	6.0	14.61%	\$18,142.10
ECM #9	Water Conservation	\$380	\$185	\$0	\$565	\$3,949	\$0	\$3,949	10	\$39,490	\$0	6889.4%	0.1	698.94%	\$33,120.77
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	19.2 kW PV System	\$91,655	\$0	\$0	\$91,655	\$3,173	\$3,361	\$6,534	15	\$98,012	\$50,421	6.9%	14.0	0.85%	(\$13,650.46)

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

APPENDIX B

Concord Engineering Group, Inc.

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



SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February 11, 2013:

Electric Chillers

Water-Cooled Chillers	\$16 - \$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
A/C Economizing Controls	≤ 5 tons \$85/unit; >5 tons \$170/unit

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	\$2.00 per MBH, but not less than \$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	\$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	\$1,200 - \$2,700
Low Intensity Infrared Heating	\$300 - \$500 per unit

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per VFD rated hp
Compressors	\$5,250 to \$12,500 per drive
Cooling Towers \geq 10 hp	\$60 per VFD rated hp
Boiler Fans \geq 5 HP	\$65 to \$155 per hp
Boiler Feed Water Pumps \geq 5 HP	\$60 to \$155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit \$55 – \$300 per hp New Hood \$55 - \$250 per hp

Natural Gas Water Heating

Gas Water Heaters \leq 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 (Expires 3/1/2013)	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities (Expires 3/1/2013)	\$25 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	\$15 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 per fixture
HID \geq 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID \geq 100w Replacement with new HID \geq 100w	\$70 per fixture

Prescriptive Lighting - LED

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 (1x4, 2x2, 2x4 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Screw-based & Pin-based (PAR, MR, BR, R) Standards (A-Style) and Decorative Lamps	\$20 per lamp
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$30 per 4 foot \$42 per 5 foot \$65 per 6 foot
LED Retrofit Kits	To be evaluated through the customer measure path

Lighting Controls – Occupancy Sensors

Wall Mounted	\$20 per control
Remote Mounted	\$35 per control
Daylight Dimmers	\$25-\$50 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

Premium Motors

Three-Phase Motors (Expires 3/1/2013)	\$45 - \$700 per motor
Fractional HP Motors Electronic Commutated Motors (replacing shaded pole motors in refrigerator/freezer cases)	\$40 per electronic commutated motor

Refrigeration Doors/Covers

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

Refrigeration Controls

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

Other Equipment Incentives

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

APPENDIX C



ENERGY STAR[®] Statement of Energy Performance

19

ENERGY STAR[®]
Score¹

Sussex County Administrative Office

Primary Property Function: Office
Gross Floor Area (ft²): 35,000
Built: 1988

For Year Ending: December 31, 2012
Date Generated: February 24, 2014

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

Property & Contact Information

Property Address

Sussex County Administrative Office
1 Spring Street
Newton, New Jersey 07860

Property Owner

Sussex County Department of Central and Shared Services
1 Spring Street
Newton, NJ 07860
(____)____-____

Primary Contact

Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043
856-427-0200
mfischette@concord-engineering.com

Property ID: 3971558

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

108 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	2,334,900 (62%)
Natural Gas (kBtu)	1,445,122 (38%)

National Median Comparison

National Median Site EUI (kBtu/ft ²)	75.9
National Median Source EUI (kBtu/ft ²)	177.7
% Diff from National Median Source EUI	42%

Source EUI

252.8 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (MtCO ₂ e/year)	372
---	-----

Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

Licensed Professional

Joseph Biuso
1 Spring Street
Newton, NJ 07860
973-579-0490
jbioso@sussex.nj.us



Professional Engineer Stamp
(if applicable)

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Administrative Center

Split System Units

Tag			
Unit Type	Ductless Split	Ductless Split	
Qty	2	1	
Location	Roof	Outside on grade	
Area Served	Server Room	Mail Room	
Manufacturer	LG	Sanyo	
Model #	LSU360HV	KS0971 Indoor / C0971 Outdoor	
Serial #	107KAUU00118	0100812	
Cooling Type	DX, R-410A	DX, R-410A	
Cooling Capacity (Tons)	33,000 Btu/hr	9,000 Btu/hr	
Cooling Efficiency (SEER/EER)	8.2 EER / 16.1 EER	16 SEER	
Heating Type	Heat Pump	N/A	
Heating Input (MBH)	35,200 Btu/hr	N/A	
Efficiency	9.9 HSPF	N/A	
Fuel	Heat Pump	N/A	
Approx Age	4	3	
ASHRAE Service Life	15	15	
Remaining Life	11	12	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Administrative Center

Domestic Water Heaters

Tag			
Unit Type	Electric Water Heater	Electric Water Heater	Tankless Electric Water Heater
Qty	1	1	7
Location	3F Womens Restroom Above Ceiling	2F Womens Restroom Above Ceiling	1F Restrooms
Area Served	3F Womens/Mens Restroom	2F Womens/Mens Restroom	1F Restrooms
Manufacturer	-	AO Smith	Eemax Inc.
Model #	-	ELSF 10 912	SP4208
Serial #	-	MF89-0067568-912	-
Size (Gallons)	10 Gallons	10 Gallons	N/A
Input Capacity (MBH/KW)	1500 Watts	1500 Watts	4.1 kW
Recovery (Gal/Hr)	-	-	-
Efficiency %	98%	98%	98%
Fuel	Electric	Electric	Electric
Approx Age	25	25	4
ASHRAE Service Life	12	12	12
Remaining Life	(13)	(13)	8
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Administrative Center

Boilers

Tag		
Unit Type	Cast Iron Sectional	Cast Iron Sectional
Qty	1	3
Location	Boiler Room	Boiler Room
Area Served	1st Floor North	1st Floor South, 2nd Floor, 3rd Floor
Manufacturer	HydroTherm	Caravan Slant Fin
Model #	MR-900B	GG-300 ES
Serial #	R-2004-1891	-
Input Capacity (Btu/Hr)	900,000 Btu/hr	300,000 Btu/hr
Rated Output Capacity (Btu/Hr)	720,000 Btu/hr	240,000 Btu/hr
Approx. Efficiency %	75%	80.0%
Fuel	Natural Gas	Natural Gas
Approx Age	13	2
ASHRAE Service Life	30	30
Remaining Life	17	28
Comments		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Administrative Center

Pumps

Tag			
Unit Type	In-line	In-line	
Qty	2	2	
Location	Boiler Room	Boiler Room	
Area Served	Hot Water Loop	Hot Water Loop	
Manufacturer	Bell & Gossett	Bell & Gossett	
Model #	60 Pump	-	
Serial #	172759LF	CM0828-01 B20	
Horse Power	3/4 HP	3 HP / 2 HP	
Flow	-	-	
Motor Info	Bell & Gossett	Marathon / Baldor	
Electrical Power	208-230/460/3/60	208-230/460/3/60	
RPM	1725	1730	
Motor Efficiency %		84% / 78.5%	
Approx Age	2	13	
ASHRAE Service Life	10	10	
Remaining Life	8	(3)	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Administrative Center

Rooftop Units

Tag			
Unit Type	Packaged Rooftop Unit	Packaged Rooftop Unit	
Qty	1	2	
Location	Roof	Roof	
Area Served	1st Floor	2nd & 3rd Floor	
Manufacturer	Carrier	Trane	
Model #	50EJ-044---510EB	TCD360BE0C4B6EH1AB0D0 00HJ00000R0	
Serial #	2699F31530	C10D01869	
Cooling Type	DX, R-22	DX, R-410A	
Cooling (MBH)	40 Tons	30 Tons	
Cooling Efficiency (EER)	8.6 EER	9 EER	
Heating Type	Electric	N/A	
Heating (MBH)	-	N/A	
Supply Fan (HP)	20	10	
Approx Age	15	4	
ASHRAE Service Life	15	15	
Remaining Life	0	11	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 1C13489
Facility Name: Sussex County Admin
Address: One Spring Street
City, State, Zip: Newton, NJ

EXISTING FIXTURES			PROPOSED FIXTURE RETROFIT													RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
Department of Engineering & Planning																								
222.22	Const. Inspect. Office	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
222.22	Capitol Projects	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	3	0.20	585	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	3	0.11	324	0.09	261	\$37	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	65	\$9
122.21	Entry/Copy Area	3000	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	2	78	6	0.47	1,404	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.25	756	\$108	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	130	\$19
222.21	Office (Joe Busso)	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	3	0.20	585	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	3	0.11	324	0.09	261	\$37	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
122.21	Hall/Files Area	3000	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	2	78	4	0.31	936	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.17	504	\$72	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	86	\$12
222.21	Office of Environmental Planning	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	390	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	216	0.06	174	\$25	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	43	\$6
222.21	Office of Farmland Preservation	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	390	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	216	0.06	174	\$25	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	43	\$6
222.21	Office(Janet)	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	390	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	216	0.06	174	\$25	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	43	\$6
122.22	Planning - Open Office Area	3000	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	2	78	5	0.39	1,170	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	5	0.18	540	0.21	630	\$90	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	108	\$15
227.22	Planning - Open Office Area	3000	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	2	0.13	390	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	2	0.06	186	0.07	204	\$29	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	37	\$5
222.22	Office - Planning Director	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
222.22	Office - Planning Director	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	2	0.13	390	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	216	0.06	174	\$25	1	Existing Occupancy Controls	0	20.0%	43	\$6
222.22	Office - Special Projects	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	6	0.39	1,170	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	130	\$19
Department of Engineering & Planning - Public Works																								
232.22	Open Office	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	45	4.19	12,555	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	45	2.43	7,290	1.76	5,265	\$753	1	Existing Occupancy Controls	0	20.0%	1,458	\$208
222.22	Office - Public Works Director	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
222.22	Office - Administrator	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
122.22	Office - Assistant County Engineer	3000	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	2	78	4	0.31	936	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.17	504	\$72	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	86	\$12
222.22	Office	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
222.22	Office	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS					
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
222.22	Conference Room A	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	6	0.39	1,170	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	130	\$19
222.22	Conference Room B	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	6	0.39	1,170	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	130	\$19
227.22	Back Hall	3000	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	3	0.20	585	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	3	0.09	279	0.10	306	\$44	0	No New Controls	0	0.0%	0	\$0
55	3rd Floor Lobby	8760	65w R30 Lamp	1	65	5	0.33	2,847	Relamp	PHILIPS 120V 11w LED R30	1	11	5	0.06	482	0.27	2,365	\$338	0	No New Controls	0	0.0%	0	\$0
221.41	Stair A	8760	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall/Corner Mnt., Prismatic Lens	2	65	8	0.52	4,555	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	8	0.29	2,523	0.23	2,032	\$291	0	No New Controls	0	0.0%	0	\$0
55	2nd Floor Lobby	8760	65w R30 Lamp	1	65	4	0.26	2,278	Relamp	PHILIPS 120V 11w LED R30	1	11	4	0.04	385	0.22	1,892	\$271	0	No New Controls	0	0.0%	0	\$0
127.22	2nd Floor Lobby	8760	2x2, 2 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	78	1	0.08	683	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	1	0.03	272	0.05	412	\$59	0	No New Controls	0	0.0%	0	\$0
Human Resources																								
232.22	Reception 244	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	6	0.56	1,674	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	6	0.32	972	0.23	702	\$100	0	No New Controls	0	0.0%	0	\$0
227.22	Hall 230	3000	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	2	0.13	390	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	2	0.06	186	0.07	204	\$29	0	No New Controls	0	0.0%	0	\$0
132.22	Hall 230	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	0	No New Controls	0	0.0%	0	\$0
232.22	Office 227	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	3	0.28	837	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.12	351	\$50	1	Existing Occupancy Controls	0	20.0%	97	\$14
132.22	Office 228	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
232.22	Office 228	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Files 229	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Office 231	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	130	\$19
132.22	Hall/Copy Area 233	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	5	0.56	1,680	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	5	0.27	810	0.29	870	\$124	0	No New Controls	0	0.0%	0	\$0
127.22	Hall/Copy Area 233	3000	2x2, 2 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	78	2	0.16	468	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	2	0.06	186	0.09	282	\$40	0	No New Controls	0	0.0%	0	\$0
132.22	Office 234	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	1	Existing Occupancy Controls	0	20.0%	130	\$19
132.22	Office 235	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	1	Existing Occupancy Controls	0	20.0%	130	\$19
132.22	Office 237	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
232.22	Office 237	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	1	Existing Occupancy Controls	0	20.0%	65	\$9

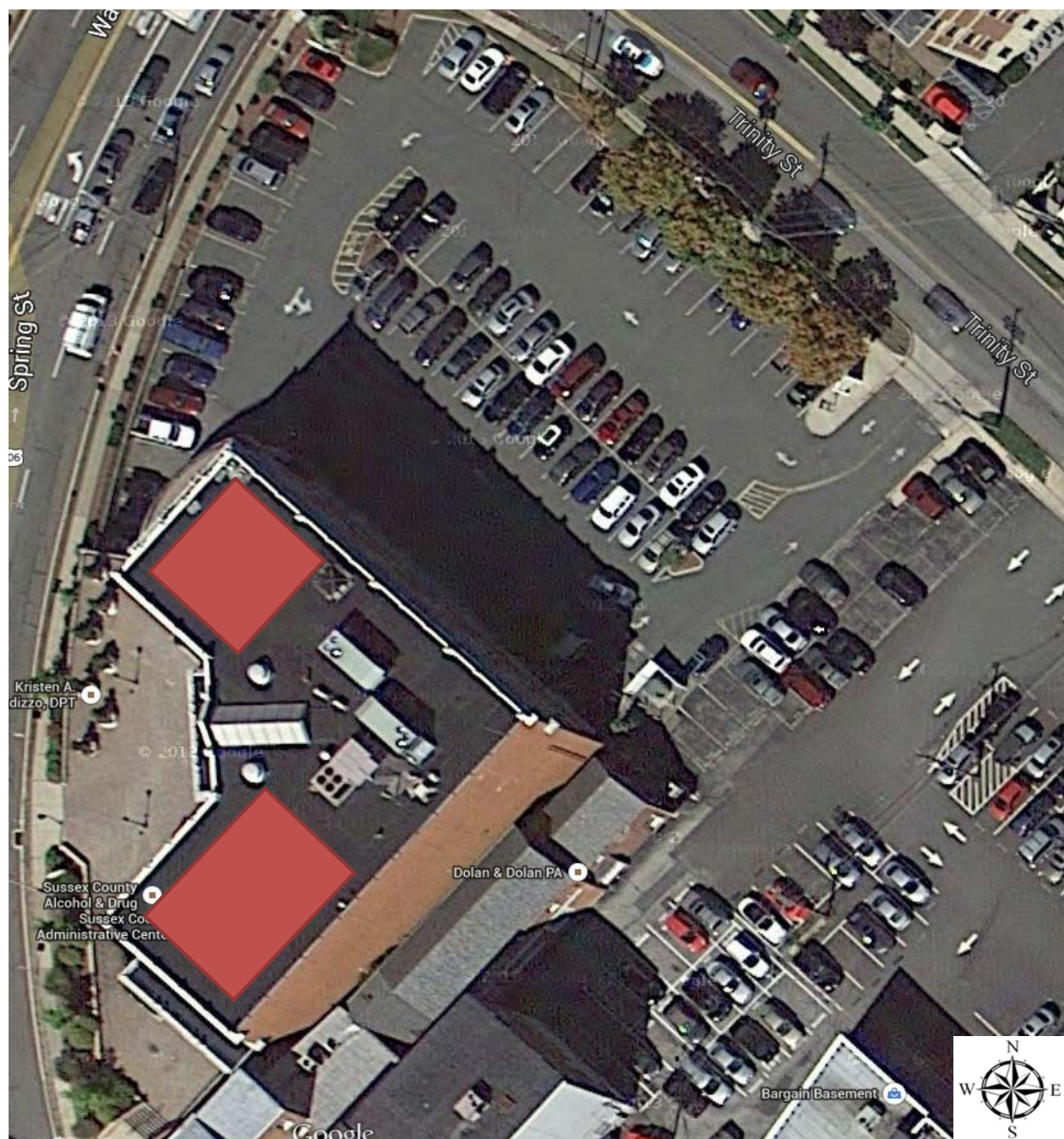
Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
132.22	Office 238	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
132.22	Office 239	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	3	0.34	1,008	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	97	\$14
132.22	Office 240	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	130	\$19
232.22	Office 241	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	6	0.56	1,674	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	6	0.32	972	0.23	702	\$100	1	Existing Occupancy Controls	0	20.0%	194	\$28
232.22	Office 242	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Office 242	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
232.22	Office 243	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	4	0.37	1,116	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.16	468	\$67	1	Existing Occupancy Controls	0	20.0%	130	\$19
132.22	Office 243	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	1	Existing Occupancy Controls	0	20.0%	130	\$19
Human Resources - Senior Services																								
132.22	Reception	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	0	No New Controls	0	0.0%	0	\$0
132.22	Office 204	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Office 208	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Office 207	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
200	Restroom 205	2600	1x2, 2 Lamp, 17w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	1	0.03	88	Bypass Ballast, Relamp	2' LED 11w; Retrofit	2	22	1	0.02	57	0.01	31	\$4	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	11	\$2
132.22	Hall	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	0	No New Controls	0	0.0%	0	\$0
132.22	Office Area 209	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	3	0.34	1,008	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.17	522	\$75	0	No New Controls	0	0.0%	0	\$0
132.22	Office 210	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	1	Existing Occupancy Controls	0	20.0%	130	\$19
232.22	Office 211	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	3	0.28	837	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.12	351	\$50	1	Existing Occupancy Controls	0	20.0%	97	\$14
122.22	Conf. Room 215	3000	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	2	78	6	0.47	1,404	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.25	756	\$108	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	130	\$19
132.22	Break Room	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	6	0.67	2,016	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	6	0.32	972	0.35	1,044	\$149	1	Existing Occupancy Controls	0	20.0%	194	\$28
132.22	Office 216	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9
132.22	Office 217	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	2	0.22	672	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	65	\$9

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
132.22	Open Office	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	3	0.34	1,008	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.17	522	\$75	0	No New Controls	0	0.0%	0	\$0
127.22	Open Office	3000	2x2, 2 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	78	2	0.16	468	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	2	0.06	186	0.09	282	\$40	0	No New Controls	0	0.0%	0	\$0
232.22	Open Office	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	9	0.84	2,511	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	9	0.49	1,458	0.35	1,053	\$151	0	No New Controls	0	0.0%	0	\$0
132.22	Training 218	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	6	0.67	2,016	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	6	0.32	972	0.35	1,044	\$149	1	Existing Occupancy Controls	0	20.0%	194	\$28
127.22	Hall	3000	2x2, 2 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	78	5	0.39	1,170	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	5	0.16	465	0.24	705	\$101	0	No New Controls	0	0.0%	0	\$0
132.22	Work Room 220	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	4	0.45	1,344	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	4	0.22	648	0.23	696	\$100	1	Existing Occupancy Controls	0	20.0%	130	\$19
132.22	Work Stations 222	3000	2x4, 3 Lamp, 34w T12, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	112	6	0.67	2,016	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	6	0.32	972	0.35	1,044	\$149	1	Existing Occupancy Controls	0	20.0%	194	\$28
227.21	Corridor 226A	8760	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	10	0.65	5,694	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	10	0.31	2,716	0.34	2,978	\$426	0	No New Controls	0	0.0%	0	\$0
221.41	Stair B	8760	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall/Corner Mnt., Prismatic Lens	2	65	8	0.52	4,555	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	8	0.29	2,523	0.23	2,032	\$291	0	No New Controls	0	0.0%	0	\$0
232.22	Men's Restroom 223	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	3	0.28	725	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	421	0.12	304	\$44	1	Existing Occupancy Controls	0	20.0%	84	\$12
232.22	Women's Restroom 225	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	3	93	3	0.28	725	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	421	0.12	304	\$44	1	Existing Occupancy Controls	0	20.0%	84	\$12
First Floor																								
55	Lobby	8760	65w R30 Lamp	1	65	4	0.26	2,278	Relamp	PHILIPS 120V 11w LED R30	1	11	4	0.04	385	0.22	1,892	\$271	0	No New Controls	0	0.0%	0	\$0
232.21	Open Office Area 154	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	28	2.60	7,812	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	28	1.51	4,536	1.09	3,276	\$468	1	Existing Occupancy Controls	0	20.0%	907	\$130
222.21	Break Room 125	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	4	0.26	780	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	4	0.14	432	0.12	348	\$50	1	Existing Occupancy Controls	0	20.0%	86	\$12
222.21	Copy Room	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	6	0.39	1,170	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	130	\$19
222.21	Open Office 130	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	6	0.39	1,170	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	6	0.22	648	0.17	522	\$75	1	Existing Occupancy Controls	0	20.0%	130	\$19
232.21	Office 54	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
232.21	Office 40	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
232.21	Office - Head Of Treasury	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	3	0.28	837	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.12	351	\$50	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	97	\$14
221.21	Storage 150	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	390	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	216	0.06	174	\$25	0	No New Controls	0	0.0%	0	\$0
222.21	Men's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	338	Bypass Ballast, Relamp	4" Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	187	0.06	151	\$22	1	Existing Occupancy Controls	0	20.0%	37	\$5

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
222.21	Women's Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	65	2	0.13	338	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	2	36	2	0.07	187	0.06	151	\$22	1	Existing Occupancy Controls	0	20.0%	37	\$5
232.21	Open Office 121	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	8	0.74	2,232	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	8	0.43	1,296	0.31	936	\$134	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	259	\$37
232.21	Open Office 120	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	7	0.65	1,953	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	7	0.38	1,134	0.27	819	\$117	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	227	\$32
232.21	Office 114	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
232.21	Office 115	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	2	0.19	558	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	2	0.11	324	0.08	234	\$33	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	65	\$9
232.21	Office 116	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	3	0.28	837	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.12	351	\$50	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	97	\$14
232.21	Office 117	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	93	3	0.28	837	Bypass Ballast, Relamp	4' Alledra 18w LED; LLT-X-T8-Y-SW-120-Z-S-N	3	54	3	0.16	486	0.12	351	\$50	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	97	\$14
227.22	Meeting Room	3000	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	65	14	0.91	2,730	Retrofit Kit - Remove Lense Bypass Ballast	Phillips LED Evokit 2x2 P 32L 31W840 2 0-10 7 G2	1	31	14	0.43	1,302	0.48	1,428	\$204	0	No New Controls	0	0.0%	0	\$0
Exterior & Garage																								
56	Parking Garage	4400	52w LED Retrofit	1	52	12	0.62	2,746	Existing to Remain	No Change	1	52	0	0.62	2,746	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
57	Exterior	4400	100w MH Down Light	1	120	6	0.72	3,168	Bypass Ballast, Relamp	Phillips 18w LED PAR38	1	18	6	0.11	475	0.61	2,693	\$385	0	No New Controls	0	0.0%	0	\$0
	TOTAL					430	37	127,358					418	19	64,846	17.62	62,511	\$8,939			23		8,738	\$1,249

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Total KW _{AC}	Panel Weight (41.9 lbs)	W/SQFT
Administrative Center	1975	SHARP ND-240QCJ	80	17.5	1,403	19.20	22,187	15.6	3,352	13.68



= Proposed PV Roof Layout

Notes:

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

Project Name: LGEA Solar PV Project - Administrative Center									
Location: 1 Spring Street, Newton, NJ									
Description: Photovoltaic System 100% Financing - 15 year									
Simple Payback Analysis									
		Photovoltaic System 100% Financing - 15 year							
Total Construction Cost		\$91,655							
Annual kWh Production		22,187							
Annual Energy Cost Reduction		\$3,173							
Average Annual SREC Revenue		\$3,361							
Simple Payback:		14.03						Years	
Life Cycle Cost Analysis									
Analysis Period (years):		15				Financing %:		100%	
Discount Rate:		3%				Maintenance Escalation Rate:		3.0%	
Average Energy Cost (\$/kWh)		\$0.143				Energy Cost Escalation Rate:		3.0%	
Financing Rate:		6.00%				Average SREC Value (\$/kWh)		\$0.152	
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	\$0	0	0	0	\$0	0	0	0	0
1	\$0	22,187	\$3,173	\$0	\$5,547	\$5,394	\$3,888	(\$562)	(\$562)
2	\$0	22,076	\$3,268	\$0	\$5,519	\$5,154	\$4,127	(\$494)	(\$1,056)
3	\$0	21,966	\$3,366	\$0	\$5,491	\$4,899	\$4,382	(\$424)	(\$1,480)
4	\$0	21,856	\$3,467	\$0	\$4,371	\$4,629	\$4,652	(\$1,443)	(\$2,923)
5	\$0	21,747	\$3,571	\$224	\$4,349	\$4,342	\$4,939	(\$1,585)	(\$4,508)
6	\$0	21,638	\$3,678	\$223	\$4,328	\$4,037	\$5,244	(\$1,498)	(\$6,006)
7	\$0	21,530	\$3,788	\$222	\$3,229	\$3,714	\$5,567	(\$2,485)	(\$8,491)
8	\$0	21,422	\$3,902	\$221	\$3,213	\$3,370	\$5,911	(\$2,386)	(\$10,878)
9	\$0	21,315	\$4,019	\$220	\$3,197	\$3,006	\$6,275	(\$2,284)	(\$13,162)
10	\$0	21,208	\$4,140	\$218	\$2,121	\$2,619	\$6,662	(\$3,239)	(\$16,401)
11	\$0	21,102	\$4,264	\$217	\$2,110	\$2,208	\$7,073	(\$3,124)	(\$19,526)
12	\$0	20,997	\$4,392	\$216	\$2,100	\$1,772	\$7,510	(\$3,006)	(\$22,532)
13	\$0	20,892	\$4,524	\$215	\$1,045	\$1,309	\$7,973	(\$3,928)	(\$26,460)
14	\$0	20,787	\$4,659	\$214	\$1,039	\$817	\$8,464	(\$3,797)	(\$30,257)
15	\$0	20,683	\$4,799	\$213	\$1,034	\$295	\$8,986	(\$3,661)	(\$33,918)
Totals:		321,405	\$59,010	\$2,403	\$48,694	\$47,564	\$91,655	(\$33,918)	(\$198,160)
Net Present Value (NPV)							(\$23,804)		