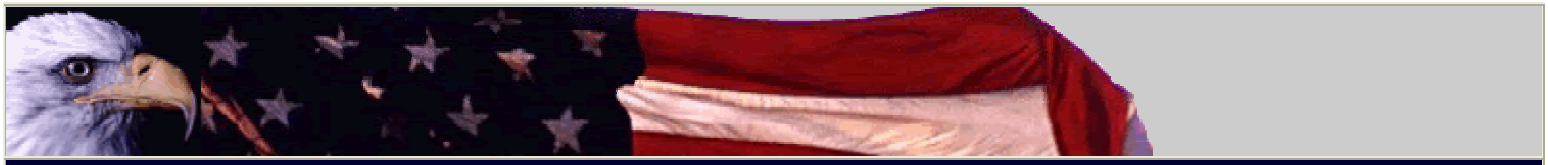

Manchester Township, NJ

ENERGY AUDIT – FINAL REPORT
CEG PROJECT NO. 9C08129

TOWNSHIP OF MANCHESTER
DIVISION OF UTILITIES
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Table of Contents

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I. EXECUTIVE SUMMARY

This report presents the findings of an energy audit conducted for:

Manchester Township Municipal Complex
1 Colonial Drive
Manchester, NJ 08759

Facility Contact Person: Joseph P. Veni

This audit was performed in connection with the New Jersey Clean Energy Local Government Energy Audit Program. These energy audits are conducted to promote the office of Clean Energy's mission, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	$ 139,565
Natural Gas	$ 31,102
Total	$ 170,667

The potential annual energy cost savings are shown below in Table 1. The cost of each measure for this level of auditing is ± 20% until detailed engineering, specifications, and hard proposals are obtained.

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)
1	Lighting Upgrade	$ 18,105	$25,427	0.71
2	Lighting Controls	$3,600	$394	4.0
3	Building Envelope Improvements	$112,500	$1,879	59
4	Replace HHW Boilers	$64,000	$5,131	12.5
5	Replace DHW Boiler	$9,510	$606	15.7
6	Replace Condensing Units	$32,070	$2,914	11.0
7	Programmable Thermostats	$1,600	$541	2.9
8	Premium Efficiency Motors	$4,475	$782	5.7
Totals		**$245,860**	**$37,674**	

The estimated demand and energy savings are shown below in Table 2. The information in this table corresponds to the ECM's in Table 1.

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	TOTAL KW REDUCTION	TOTAL ANNUAL KWH REDUCTION	TOTAL THERMS OF NATURAL GAS REDUCED
1	Lighting Upgrade	53.73	158,919	
2	Lighting Controls		5,535	
3	Building Envelope Improvements			1,104
4	Replace HHW Boilers			2,883
5	Replace DHW Boiler			356
6	Replace Condensing Units		17,357	
7	Programmable Thermostats		3,224	141
8	Premium Efficiency Motors		4,888	
Totals		**53.73**	**189,923**	**4,484**

Note: Other than water conservation measures, we cannot make any additional recommendations for the Department of Public Works Mechanics Garage. The building is adequately insulated, has no windows, uses Solatubes for day lighting, T-5 high bay fixtures with photocells/dimming ballast, recycled oil for heating the space, etc. Therefore, the garage energy usage is not included in any of the analysis in this report since it would skew the results.

Based on the results of the energy audit performed for Manchester Township, Concord Engineering Group strongly recommends the implementation of all ECM's that provide a calculated simple payback at or under seven (7) years. The following Energy Conservation Measures are recommended for the Manchester Township Municipal Offices/Court and Police Offices/Court areas within the Municipal Complex:

- **ECM #1:** Lighting Upgrade
- **ECM#2:** Lighting Controls
- **ECM#7:** Programmable Thermostats
- **ECM#8:** Premium Efficiency Motors

At a minimum, the Owner should look to implement ECM #1 and ECM #2 in a combined effort. This "Lighting Upgrade Package" would have an estimated total cost of $21,705, total energy savings of $25,821 and a simple payback equaling 0.8 years.

II. INTRODUCTION

The Manchester Township facilities covered by this energy audit include the following:

Building Description	Area
Municipal Offices/Court	24,640 SF
Police Offices/Court	21,070 SF
Department of Public Works Garage	7,200 SF
Total:	52,910 SF

The first task was to collect and review two years worth of utility energy data for electricity and natural gas. This information was used to analyze operational characteristics, calculate energy benchmarks for comparison to industry averages, estimate savings potential, and establish a baseline to monitor the effectiveness of implemented measures. A computer spreadsheet was used to enter, sum, and calculate benchmarks and to graph utility information (see Appendix A).

The Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr) and can be used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting annual consumption of all fuels to BTU's then dividing by the area (gross square footage) of the building. EUI is a good indicator of the relative potential for energy savings. A comparatively low EUI indicates less potential for large energy savings. Blueprints obtained from the Township were used to calculate the gross area of the three buildings.

Obtaining Architectural and Mechanical drawings, a building profile was created that included age, occupancy, description, and existing conditions of Architectural and Mechanical Systems. The profile noted the major energy – consuming equipment or systems and components that are inherently inefficient. Also, by reviewing the mechanical drawings and equipment schedules, questions regarding the lighting systems/controls, HVAC zone controls, or setback operations were noted.

The site visit was spent inspecting the actual systems and answering specific questions from the preliminary review. The building manager provided occupancy schedules, O & M practices, the building energy management program, and other information that has an impact on energy consumption.

The post-site work included evaluation of the information gathered during the site visit, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on mechanical, lighting and building envelope improvements.

III. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from January-08 to December-08. Jersey Central Power & Light provides electricity to the facility under the General Service Secondary Rate. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. 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 most current rate structure available.

Table 4 and Figure 2 show the natural gas energy usage for the surveyed municipal/police complex from January-08 to December-08. Pepco Energy Services supplies the natural gas from the wellhead to the New Jersey Natural Gas pipelines. New Jersey Natural Gas charges a rate per therm for delivery of the natural gas via their pipelines to the burners.

Description	Average
Electricity	16¢/kWh
Natural Gas	$1.78 / Therm

Table 3
Electricity Billing Data

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
1/08	61,160	140	$9,097
2/08	64,520	151	$9,600
3/08	62,920	158	$9,098
4/08	56,560	160	$8,418
5/08 ***	64,400	218	$11,279
6/08	61,840	280	$15,165
7/08	93,000	217	$16,397
8/08	85,680	211	$15,189
9/08	79,640	215	$13,914
10/08 ***	71,640	184	$11,489
11/08	68,560	166	$10,452
12/08 ***	59,520	159	$9,468
Totals	831,440	280 max	$139,565

***Utility information estimated, due to missing utility bills.

Figure 1
Electricity Usage Profile

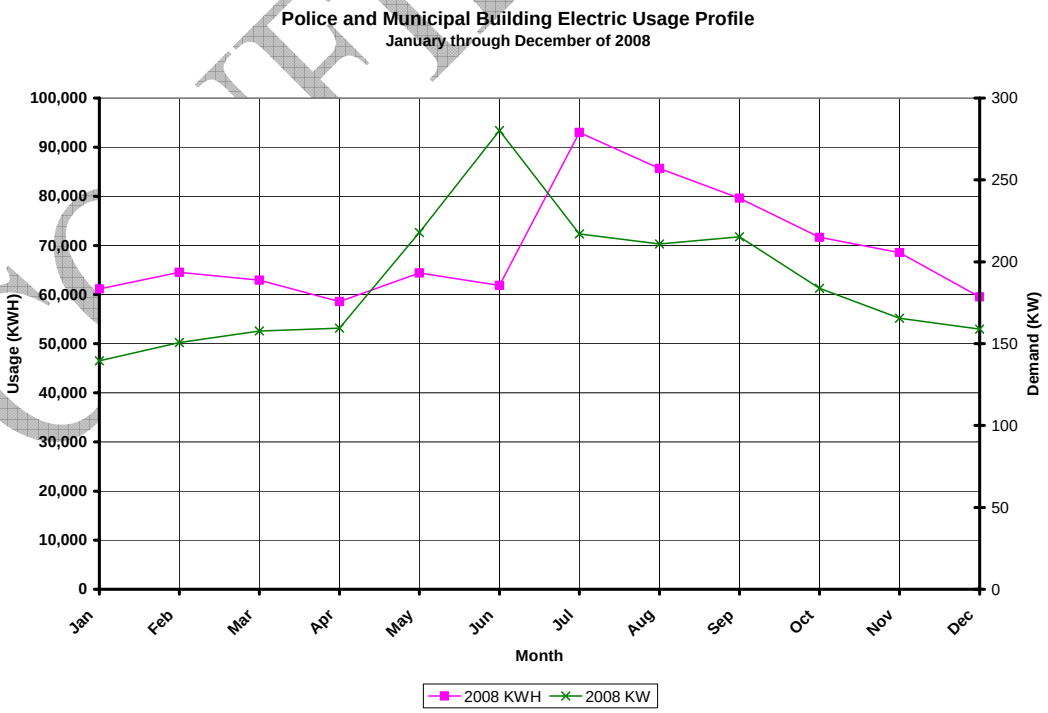
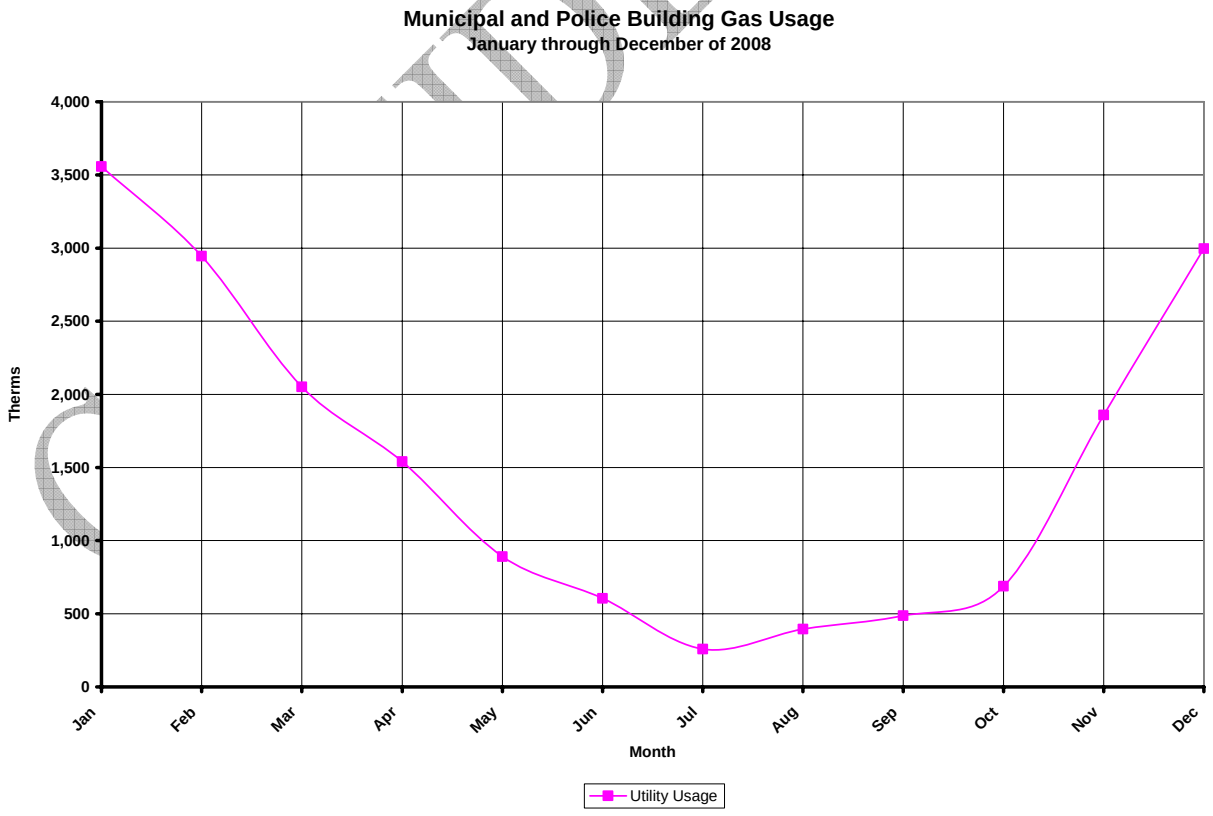


Table 4
Natural Gas Billing Data

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
1/08	3,557	$5,229
2/08	3,079	$4,463
3/08	2,146	$3,434
4/08	1,611	$2,848
5/08	931	$1,903
6/08	632	$1,555
7/08	271	$946
8/08	415	$1,260
9/08	511	$1,357
10/08	720	$1,218
11/08	1,859	$2,695
12/08	2,997	$4,196
Totals	18,274	$31,102

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. Their website allows the user to determine how well the client's building energy use intensity (EUI) compares with similar facilities in the U.S. and NJ.

Municipal and Police Building EUI = (Electric Usage in kBtu/h + Gas Usage in kBtu/h) / SF

Electric = ((831,440 kWh) * (1000 W/kW) * (3.414 Btu/h / 1 W))/ (1000 Btu/h / 1 kBtu/h)
= 2,838,536.16 KbTU/h

Gas = ((18,274 therms) * (100,000 Btu/h / 1 W)) / (1000 Btu/h / 1 kBtu/h) = 1,827,400 kBtu/h

EUI = (2,838,536.16 KbTU/h + 1,827,400 kBtu/h) / (45,710 SF) = 102.08 kBtu/SF

Municipal and Police Building EUI = 102.08 kBtu/SF

Figure 3
Energy Use Intensity Distributions: Offices

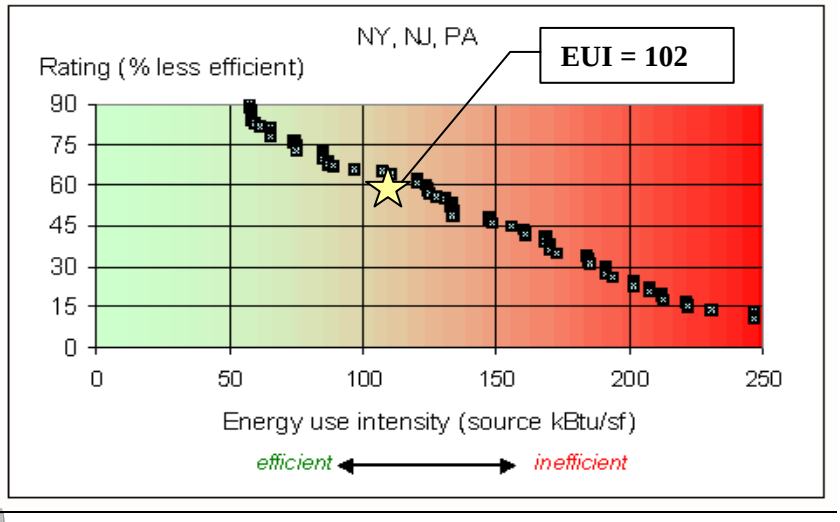
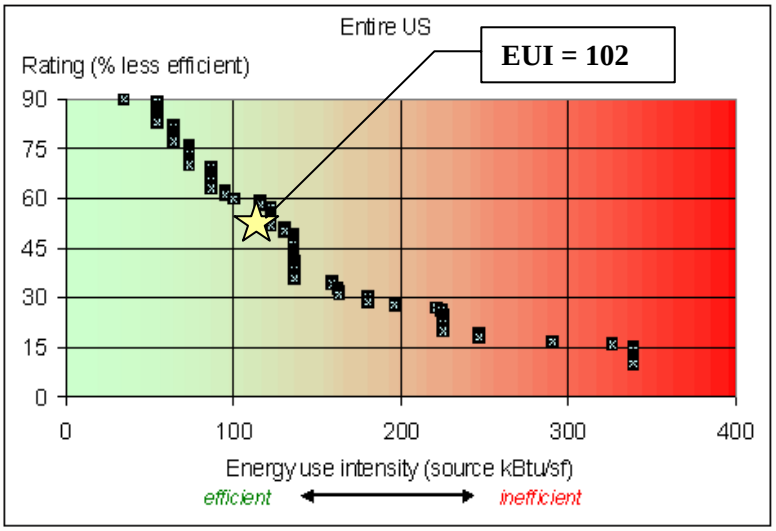


Figure 4
Energy Use Intensity Distributions: Police Stations



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows you to track and assess energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and more emphasis is being placed throughout multiple arenas on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than $10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. Therefore, it is vital that local government municipalities assess their energy usage, benchmark this usage utilizing Portfolio Manager, set priorities and goals to lessen their energy usage and move forward with these priorites and goals. Saving energy will in-turn save the environement.

Utilizing the utility bills and other information gathered during the energy audit process, CEG entered the respective data into Portfolio Manager and the following is a summary of the results:

Table 5
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Manchester Twp Municipal/Court and Police Station	51	50
Manchester Twp Mechanics Garage	N/A	N/A

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an "Other" category. The Manchester Township Public Works Garage falls under this "Other" category. The "Other" category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Performance Rating cannot be calculated if more then 10% of a building is classified as "Other." The majority of the Public Works Garage would be classified as "Other" and therefore cannot be given an Energy Performance Rating.

Refer to Appendix D for detailed energy benchmarking report entitled "STATEMENT OF ENERGY PERFORMANCE."

IV. FACILITY DESCRIPTION

The Manchester Township Municipal Complex consists of the Municipal Offices, Court, Police Offices and Public Works Mechanics Shop (total of 52,910 SF)

The Municipal/Police building is a three story structure of steel, brick, and block construction with a wood A-frame roof. The facility was built in 1988 with an area of 45,710 SF and consists of the police section with operating hours of 24/7/365. The other section is the Municipal Offices/Court with the offices occupied from 7am to 5pm and the Courtroom occupied on Wednesday and Thursday.

Heating System

The municipal offices and the police station are heated by eight (8) HydroTherm boilers rated at 2,400,000 MBH total input and 1,872,000 MBH output (78% Efficiency at Full Load). Only four modules are required to heat this section (1,200,000 MBH) on a cold winter day (below 20ºF). We assume that the other four (4) modules are backup units.

Hot water is provided to the air handling units and Packaged Terminal Air Conditioners (PTAC) units of the court room and front end offices via one H.B. Smith cast-iron boiler rated at 675 MBH input and 540 MBH output (80% Efficiency at Full Load).

Hot water is distributed by nine (9) zone pumps ranging in size from 0.75 to 1.5 HP. There is also one standby pump and a small circulating pump. Hot water is supplied to six air handling units, cabinet unit heaters, etc.

Domestic Hot Water

Domestic hot water for the Municipal Offices/Court is provided by a RHEEM gas-fired, 92-gallon capacity hot water heater rated at 300,000 Btu/hr input. An A O Smith 100-gallon, gas-fired hot water heater rated at 197,000 Btu/hr input serves the Police section.

Cooling System

Cooling in the core of the building is provided by twenty-three (23) outdoor condenser/compressor units that feed refrigerant to evaporator coils in the air handling units and ductless split systems. The self-contained Packaged Terminal Air Conditioners (PTAC's) supply cooling for the private offices, conference room, etc.

Controls System

All HVAC units are controlled by local or remote thermostats. We could not determine an actual level of accuracy of the thermostats without recalibration instrumentation. In addition, we observed that several supply air and return air damper actuators on the air handlers were not responding when we raised the temperature on the respective thermostats.

V. EQUIPMENT LIST

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, lack of nameplates, etc.

Table 6 thru 11
Existing Equipment Listing

HEATING EQUIPMENT					
Description	**Qty**	**Rated Capacity**	**Fuel**	**ASHRAE Service Life**	**Remaining Useful Life**
H. B. Smith CCC-10-W	1	540 MBH	NG	35	22
HydroTherm MR-2400B	8	1,872 MBH	NG	25	4

COOLING EQUIPMENT				
Description	**Qty**	**Capacity**	**ASHRAE Service Life**	**Remaining Useful Life**
Carrier 38AE014	2	12.5 Tons	20	0
Carrier 38QH036	1	3 Tons	20	0
Sanyo C42-32	2	3.5 Tons	15	10
Sanyo CO911	4	0.75 Ton	15	10
Sanyo CH3642	2	3 Tons	15	10
Sanyo C3032A	1	2.5 Tons	15	10
Sanyo CL4232	1	3.5 Tons	15	10
Sanyo CO951	1	0.75 Ton	15	10
Sanyo C1251	1	1 Ton	15	10
Thermal Zone MS29A	1	0.75 Ton	15	10
Int'l Comfort Products (CAE120)	2	10 Tons	20	0
Int'l Comfort Products (CAE180)	1	1.5 Tons	20	0
Int'l Comfort Products (N2A060)	1	5 Tons	20	0
York H1CE180A	1	1.5 Tons	20	0
Mitsubishi P436EK	1	3 Tons	15	10
Arcoaire NAC024	1	2 Tons	15	10
Amana PTC153A	65	1.18 Tons	20	0
Carrier 52CEA312	6	1 Ton	20	16

DOMESTIC HOT WATER SYSTEM					
Description	**Qty**	**Capacity**	**Fuel**	**ASHRAE Service Life**	**Remaining Useful Life**
A.O. Smith BTC 197 (197 MBH)	1	100 gal	NG	15	12
RHEEM RFD300-92 (300 MBH)	1	92 gal	NG	15	0
A.O. Smith (4500 Watts)	1	40 gal	Electricity	-	-

VENTILATION EQUIPMENT				
Description	**Qty**	**Fan HP/kW**	**ASHRAE Service Life**	**Remaining Useful Life**
Nesbitt AHU AL-C-4F	2	1.5HP	15	0
AHU *	1	1 HP	15	0
Carrier AHU 40RR-014-530	3	2@ 1.49 kW	15	0
AHU *	2	7.5 HP Supply 1.5 HP Exhaust	15	0
ILG Industries Exhaust Fan	1	3/8 HP	25	0
* Exhaust Fan	2	1/12 HP	25	0

HOT WATER PUMPS				
Description	**Qty**	**Pump HP**	**ASHRAE Service Life**	**Remaining Useful Life**
HW Pump	4	0.75	10	0
HW Pump	3	1.0	10	0
HW Pump	1	0.25	10	0
HW Pump	1	1.5	10	0

DOMESTIC HOT WATER PUMPS				
Description	**Qty**	**HP/Amps**	**ASHRAE Service Life**	**Remaining Useful Life**
DHW Pump	1	0.25 HP	10	2
DHW Pump	1	0.74 A	10	0

Note: A more detailed equipment list can be found in Appendix B.

VI. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade

1.1 Upgrade the Fluorescent Lighting

Improved fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts. A simple retrofit of the existing fixture can provide substantial savings. A conventional drop-ceiling lay in fixture with four, 4-foot lamps (34 Watt lamps with a magnetic ballast) has a total wattage of 168 Watts per fixture. By using the improved lamps and ballasts, the total wattage would be reduced to 75 Watts. The light levels would increase by about 15% and the light quality would increase by 35%.

Typically, T8 lamps can fit into the existing fixtures with minimal fixture modifications. The lamps are 1" in diameter instead of the 1.5' diameter of the existing T12 lamps. (The number after the "T" indicates the diameter in 8ths of an inch. Hence, T8=8/8 or 1", while T12=12/8 or 1.5".) The reduced surface area allows the use of more costly inside coatings (phosphors). The improved phosphors provide a greatly improved color rendering index (CRI). A T12 typically has a CRI of about 55. A typical T8 has a CRI of about 75.

Magnetic ballasts are replaced with electronic ballasts which also fit into the existing fixtures with minimal fixture modifications. Magnetic ballasts increase the energy usage of the lighting system due to their operating characteristics. An electronic ballast reduces energy usage of the lighting system. In addition, a single electronic ballast can operate up to four lamps in a fixture. Magnetic ballasts can only operate up to two lamps. The electronic ballasts could reduce the amount of ballasts in your facility by half. This is accomplished by "tandem wiring" of ballasts. Rather than using one electronic ballast for every one fixture, one ballast may be used for two or more fixtures. The electrician wires a single ballast to operate the lamps in adjacent light fixtures which further reduces the number of ballasts needed.

1.2 Install Compact Fluorescent Lighting

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light.

The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 25-Watt CFL for a 100-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output.

A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures.

1.3 Install LED Exit Signs

LED is an acronym for light-emitting-diode. LED's are small light sources that are readily associated with electronic equipment. LED exit signs have been manufactured in a variety of shapes and sizes. There are also retrofit kits that allow for simply modification of existing exit signs to accommodate LED technology. The benefits of LED technology are substantial. LED exit signs will last for 20-30 years without maintenance. This results in tremendous maintenance savings considering that incandescent or fluorescent lamps need to be replaced at a rate of 1-5 times per year. Lamp costs ($2-$7 each) and labor costs ($8-$20 per lamp) add up rapidly. Additionally, LED exit lights only uses 2 Watts. In comparison, conventional exit signs use 10-40 Watts. It is recommended that samples of the products be installed to confirm that they are compatible with the existing electrical system.

Simple Payback for All Lighting Upgrades = 8.5 months

A detailed Investment Grade Lighting Audit can be found in Appendix C.

ECM #2: Install Lighting Controls

Install Lighting Controls to Reduce the Lighting Use

In some areas the lighting is left on unnecessarily. There has been a belief that it is better to keep the lights on rather than to continuously switch them on and off. This on/off dilemma was studied, and it was determined that the best option is to turn the lights off whenever possible. Although this practice reduces the lamp life, the energy savings far outweigh the lamp replacement costs.

Lighting controls are available in many forms. Lighting controls can be as simplistic as an additional switch. Timeclocks are often used which allow the user to set an on/off schedule. Timeclocks range from a dial clock with on/off indicators to a small box the size of a thermostat with user programs for on/off schedule in digital format. Occupancy sensors detect motion and will switch the lights on when the room is occupied. They can either be mounted in place of the current wall switch, or they can be mounted on the ceiling to cover large areas. Lastly, photocells are a lighting control that sense light levels and will turn the lights off when there is adequate daylight. These are mostly used outside, but they are becoming much more popular in energy-efficient office designs as well.

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, conference rooms, restrooms, lunch rooms, storage rooms, lounges, file rooms, etc.

From Appendix C of this report, we calculated the lighting power density (Watts/ft^2) of the existing municipal complex to be 105,510 Watts / 45,710 SF = 2.31 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

10% x 2.31 Watts/SF x 5,760 SF x 4,160 hrs/yr.

= 5,535 kWh x $0.16Wh

Savings = $885 / yr

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper, etc. Installation cost per dual-technology sensor is $75/unit. Total number of rooms to be retrofitted is 48 (5,760 SF). Total cost to install sensors is $3,600.

Simple Payback = 4 Years

ECM #3: Building Envelope Improvement

3.1 Install energy efficient windows

The word "envelope" refers to the "shell" of the building: exterior walls, roof, windows, and doors. To improve the envelope would require upgrading of materials or equipment to enhance the insulation or to reduce the amount of unconditioned outside air infiltration that enters the building.

Building envelope improvements may require a significant investment. Typically, the investment is recovered through energy savings however; the payback is generally quite protracted. For example, in a drafty building, adding insulation or upgrading the windows would improve comfort. Human comfort impacts productivity as uncomfortable or unhappy occupants will have a higher absentee rate and/or will require additional time from maintenance personnel as they search for stopgap solutions to the comfort problem.

For the following energy savings calculations, we obtained heating and cooling degree days from the McGuire Air Force Base weather data and the window areas from the Architectural drawings for this facility.

Heating Degree Days = 5,380°F – day/yr.

Cooling Degree Days = 3,251°F – day/yr.

Total window area to be retrofitted = 3,000 SF

Existing AC = 7.0 EER

U_{exist} = 0.85 Btu/hr – ft^2 - °F

CEG would recommend replacement of the existing single pane windows with Andersen Vinyl-Clad Wood Frame, Dual-Pane, Low-E, SmartSun® Glazing with Argon Gas Blend Window System with U-Factor = 0.28, Solar Heat Gain Coefficient = 0.21 and Visible Transmittance = 0.49.

U_{new} = 0.28 Btu/hr – ft^2 - °F

Annual Energy Savings (Heating) =

$$\frac{12 \text{ hrs}}{\text{Day}} * \text{Window Areas} * (U_{exist}-U_{new}) * \text{HDD}$$

= 12 * 3,000 * (0.85-0.28) * 5,380 = 110.4 MMBtu = 1,104 Therms

Annual Energy Savings (Cooling) =

$$\frac{12 \text{ hrs/day} * \text{Window Areas} * (U_{EXIST} - U_{NEW}) * CDD}{\text{Existing AC EER}} =$$

$$\frac{12 * 3{,}000 * (0.85-0.28) * 3{,}251}{7.0} = 9.5 \text{ MMBTU} = 2{,}784 \text{ kWh}$$

Total Energy Savings = 1,104 Therms x \$1.78 + 2,784 kWh x \$0.16

= \$2,410

Upgraded Window Cost = \$74,700

Simple Payback for Upgraded Windows = 31 Years

3.2 Add insulation to attics

The existing attic spaces in the municipal police building were insulated with R-11 batt but, due to age and moisture, have deteriorated to R-Value = 9.0 (U_{EXIST} = 0.111). We recommend adding additional insulation between the attic roof trusses to increase the R-value to 23.0 (U_{NEW} = 0.043).

Detailed energy savings calculations:

HDD = 5,380°F – day/yr

Heating system efficiency for existing boilers = 60%

Energy Savings (Heating) =

$$12 \frac{\text{hrs}}{\text{Day}} * \text{SF of Roof} * (U_{EXIST} - U_{NEW}) \text{ x HDD/Boiler Eff.}$$

= [12 * 18,000 * (0.111-0.043) * 5,380] / 0.60

= 131.7 MMBTU = 1,317 Therms

Energy cost savings = 1,317 Therms x \$1.78/therms = \$2,344/Yr

Installed cost of R-13 insulation = \$2.10/SF

= \$2.10 (18,000 SF) = \$37,800

Simple Payback for Attic Insulation = \$37,800/\$2,344 = 16.1 Years

Simple Payback for This Measure = 23.7 Years

ECM #4: Replace Heating Hot Water Boilers

The municipal offices/court section of the building is heated by 1988 vintage modular boilers with a peak efficiency of 55% and a total capacity of 2,400 MBH. Our building energy simulation calculated the building peak heating load to be only 931 MBH. It appears that the existing hot water heating system is oversized. During the site visit on 1/22/09, the outside temperature was 22°F and only three of the eight boilers were required to meet heating demand. These modular heating hot water boilers are beyond their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to escalating owning and maintenance costs, these units should be replaced.

We recommend that the eight (8) HydroTherm Multi-Temp Boilers (Model # MR-2400B) be replaced by two (2) Aerco Modulex high-efficiency boilers rated at 606 MBH each.

Existing HW Boilers:

Rated Capacity = 300 MBH natural gas each x 4 units = 1,200 MBH

Note: Only four (4) units run during very cold weather

Combustion Efficiency = 60%
Radiation Losses = 5%
Net Efficiency = 55%

Replacement Boilers:

High Efficiency Aerco or Equal (with Sequencing Control & O/A HW Reset)

Rated Capacity = 606 MBH Nat. Gas x 2 units = 1,212 MBH
Combustion Efficiency = 88%
Radiation Losses = 0.5%
Net Efficiency = 84.5%

Operating Data:

Heating Season Fuel Consumption = 8,260 Therms
(Based on gas billing data)

Average Cost of Natural Gas = $1.78/Therm

Operating Hours during Heating Season: 3,240 hrs

Energy Savings = Old Boiler Energy Input * ((New Boiler Efficiency – Old Boiler) / New Boiler Efficiency))

Energy Savings = 8,260 x $\frac{(.845-.55)}{(0.845)}$

= 2,883 Therms

Cost Savings = Annual Energy Savings * $/Therm

= 2,883 Therms * $1.78/Therm

= $5,131 / yr.

Installed cost of two (2) Aerco Modulex high-efficiency boilers = $64,000

Simple Payback = $64,000 / $5,131= 12.5 Years

ECM #5: Replace Domestic Hot Water Boiler

The domestic hot water boiler for the municipal/court section of the building was installed in 1988. Based on the site survey and old RHEEM performance data, the net peak efficiency of this unit is approximately 70%. The domestic hot water load for the municipal/court section consists of: general-use sinks in pantry areas, bathroom sinks, and a residential-type kitchen area located in the basement of the facility that serves events in the Community Gathering / Multi-Purpose Room. The existing RHEEM domestic hot water boiler is approximately twenty-one (21) years of age and is close to exceeding its expected service life of twenty-five (25) years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. Due to the fact that the equipment is due to be replaced very soon and technology has provided equipment with greater efficiency, the domestic hot water boiler is a good candidate for replacement.

This energy conservation measure will replace the existing gas-fired, 100-gallon capacity domestic hot water boiler with a 95% thermal efficient A.O. Smith Cyclone Xi with 100-gallon capacity.

Existing DHW Boiler

Rated Capacity = 300,000 MBH Natural Gas Fired
100 gallons storage

Thermal Efficiency = 75%
Radiation Losses = 5%
Net Efficiency = 70%

Proposed High-Efficiency DHW Boiler

Rated Capacity = 250,000 MBH Natural Gas Fired
100 gallons storage

Thermal Efficiency = 90%
Radiation Losses = 0.5%
Net Efficiency = 89.5%

Operating Data for Existing DHW Boiler

Annual fuel consumption = 1,278 Therms

Average cost of natural gas = $1.78/Therm

DHW Boiler Operating Hrs/Yr. = 1,040 Hrs.

Energy Savings = 1,278 Therms x (0.895-0.70/0.70) = 356 Therms

Cost Savings = 356 Therms x $1.78/Therms = $633/Yr.

Installed Cost of A.O. Smith Cyclone DHW Heater = $9,510

Simple Payback = $9,510 / $633/Yr. = 15 Years

ECM #6: Replace Evaporator Coil / Condensing Unit

The three air handling units that provide cooling for the building interior core are 1988 vintage Carrier split units with outdoor condensers/compressors. These units are beyond their expected service life and are very inefficient. As outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook, the estimated service life for air-cooled condensers and coils is 20 years.

This energy conservation measure would replace the evaporator coil in each air handler unit along with a new high-efficiency condenser unit.

New Condensing Units Energy Savings =

[(Tons Refrigeration x 12,000 Btu/Ton) / (1000)/(New-Old EER) x Avg. Load Factor x Hrs. of Cooling] x No. of Units

Existing Condensing Units

Rated Capacity = 12.5 Tons per Unit
Condenser Unit Efficiency = 7.0 EER
Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity - $0.16/kWh

Proposed High-Efficiency Condensing Unit

Rated Capacity = 10 Tons per Unit
New Condenser Unit Efficiency = 14.0 EER

Energy Savings = {[(12.5 Tons x 12,000 Btu/Ton)/1,000 Watts/kW) ÷ (14-7 Btu/Watt) x 0.15 x 1,800 hrs.] x 3 = 17,357 kWh/Yr.

Cost Savings = 17,357 kWh x $0.16/kWh = $2,777 / Yr.

Installed cost of (3) coils, refrigerant lines and (3) condensing units = $32,070

Simple Payback for This Measure = 11.5 Years

ECM #7: Programmable Thermostat Installation

The Municipal/Police building is fitted with standard, manual wall thermostats for various air handling units and local control with adjustable settings on the packaged terminal heating/cooling units that were installed in 1988. These indoor temperature controls are inaccurate due to temperature drift, age, and not having been re-calibrated. These units also do not have night time setback features.

This energy conservation measure would replace the eight (8) existing air handling unit thermostats with programmable 7-day thermostats and night time setback control.

Based on the following setpoints,

Occupied heating = 70° F
Occupied cooling = 74° F
Unoccupied heating = 60° F
Unoccupied cooling = 85° F

CEG recommends replacement of the existing remote thermostats with Honeywell RTH7500D 7-day programmable thermostat or equivalent.

The energy savings between the conventional thermostats and 7-day programmable thermostats was calculated by using Energy Star Life Cycle Cost Estimate software for qualified programmable thermostats. The referenced calculator can be found at www.energystar.gov.

Simple Payback of Additional Cost = 2.9 Years

ECM #8: Install NEMA Premium Efficient Motors

Existing electric motors equal to or greater than one horsepower ranged from 78 to 81% efficient. Also, in the police section of the building, the fan and pump motors run continuously due to the 24 hours per day, 365 days per year operation. The improved efficiency of the NEMA premium efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace all motors equal to or greater than 1 HP with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. Using MotorMaster +, Version 4, the energy & cost savings were calculated for the fan/pump motors in the police section that are greater than or equal to 1 HP. Since the police section operates 24 hours per day, 365 days per year, it represents the largest savings potential.

For Example: 2HP Supply Air Fan Motor in AHU-3

Existing Motor Efficiency = 80.8%
Annual Hours of Operations = 8,000
1 HP = 0.746 Watt
Load Factor = 75%
Cost of electricity = $0.16 / kWh

New NEMA Premium® Motor Efficiency = 86.5%

Existing 2HP Motor Operating Cost =

{0.746 Watt/HP x Motor HP x Load Factor x Hours of Operation x Cost of Electricity] ÷ Motor Efficiency

= [0.746 x 2 x 0.75 x 8,000 x 0.16] ÷ 0.808 = $1,773 / Year

New NEMA Premium® Efficiency Motor Operating Cost =

{0746 x 2 x 0.75 x 8,000 x 0.16} ÷ 0.865 = $1,656 / Year

Savings = $ 1,773 - $ 1,656 = $117 / Year

Installed Cost of a 2 HP NEMA Premium® Efficiency Motor = $705

Simple Payback = $705 / $117 = 6.03 Years

The following table outlines the motor replacement plan for the facility:

Table 12
Motor Replacement Plan

MOTOR HP	QTY.	UNIT COST	TOTAL COST	SAVINGS	SIMPLE PAYBACK
1	4	$395	$1,580	$306	5.2
1.5	3	$495	$1,485	$242	6.1
2	2	$705	$1,410	$234	6.0
	Total:		**$4,475**	**$782**	**5.7**

VII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy technologies for Manchester Township, and concluded that there is potential for solar and wind energy generation.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). This is not a viable option for the Public works garage due to the use of solar tubes for lighting. PV panels mounted on a flat roof would cast shadows over the solar tube opening. The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

CEG has reviewed the existing roof area of the buildings being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 5060 S.F. can be utilized for a PV system on the Municipal office and police building. A depiction of the area utilized is shown in Appendix E following the financial calculations. Using this square footage it was determined that a system size of 78 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 108,990 KWh annually, reducing the overall utility bill by 13% percent. A detailed financial analysis can be found in appendix E. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

Wind energy production is another option available through the Renewable Energy Incentive Program. Small wind turbines can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG has reviewed the applicability of wind energy for Manchester Township and has determined it is not a viable option. Low average wind speeds for the area are not adequate for wind turbine generation. Typical wind turbines start producing energy at 8 mph wind speeds. Manchester averages 4 mph wind speeds making this application impractical.

VIII. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load profile analysis is a method of study utilized by Energy Engineers to review the energy usage of a facility. Inconsistencies in the load profile will quickly show themselves so that the Engineer can recommend to the Owner further action to remedy the irregularity in energy usage. For this project, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to Section III, Figures 1 and 2 included within this report to reference the respective electricity and natural gas usage load profile for January through December 2008.

Natural Gas (Municipal and Police Building Usage):

The curves derived (January through December, 2008) demonstrate a significant heating load (November through March). The analysis clearly demonstrates substantial consumption (December through February), with little to no consumption in June through September. Accordingly, there is a clear line of delineation between summer and winter loads, matching up with the market Wholesale Energy Pricing. However, heating loads can carry a much higher weighted average price because the higher market Wholesale Pricing typically occurs during the winter when the utilities are trying to supply the heating demand to their customers.

Electricity (Municipal and Police Building Usage):

Manchester has three (3) JCP&L Electric Account Numbers:

10 00 21 3823 02, **10 00 21 3823 44 and 10 00 21 3823 83**

In reviewing Manchester's natural gas load profile (Section III, Figure 2), based on the curve a complimentary electric load profile showing a standard cooling load would typically be presumed; however, this is not the case. The electric load profile (Section III, Figure 1) clearly demonstrates a base-load pattern, identifying a much better load profile than natural gas. This is advantageous because base-load consumption profiles (or a flat load) are preferable when calculating energy costs, as it carries the most competitive pricing and efficient way of utilizing energy. The load factors by account are as follows:

Account: 10 00 21 3823 02; 50% Police Building
Account: 10 00 21 3823 44; 62% Municipal Building
Account: 10 00 21 3823 83; 33% Mechanics Shop

Based on the above-calculated load factor, the Mechanics Shop is not a good end-user of power. Furthermore, as derived from the analysis all three Manchester accounts indicate a base-load of electricity that is consumed all year, and an incremental load in summer-time for air-conditioning. This conclusion is typical of Account: 10 00 21 3823 02 (Police Building). Account: 10 00 21 3823 44 (Municipal Building) has a very steady load while Account: 10 00 21 3823 83 (Mechanics Shop) does not.

Recommendations:

CEG recommends Manchester further investigate its sharp rise in demand from April through July. We would imagine that this is due to base cooling load, but the slope seems to identify a possible problem. Based on our review of the facility and its operation, it is believed that this large change in demand is due to inefficient cooling equipment and the lack of local and global HVAC control for the packaged terminal air-conditioning units and various air-handling units. Implementation of better HVAC controls in addition to staging the initial cooling start time for various pieces of cooling equipment throughout the facility would limit this large increase in demand.

Tariff Analysis:

Electricity:

Manchester utilizes the Local Distribution Service (LDC-utility) from Jersey Central Power & Light (JCP&L). The JCP&L Rate: General Service Secondary Phase, is the rate classification.

While Manchester may be on a typical rate structure with the local utility, some variations in price cause concern, and are worth investigating further. The utility charge or delivery charge for Account #: 10 00 21 3823 02 (Police Building), for the month of June is 36% higher than the next month July, which is a true summer month. Furthermore, the $/kWh for the month of June is 28% higher than June the following month. As noted, variations in utility rates need to be reviewed with the utility company for applicability.

Natural Gas:

Based on CEG's review of the utility bills, it was noted that Manchester is utilizing the services of PEPCO Energy Services for some of its Natural Gas supply to the facilities studied. PEPCO Energy Services is a Third Party Supplier and the cost of this commodity is approximately $10.9279 / dth. This price is above spot market pricing at this time. Furthermore, it was noted that through December of 2008 Account: 094650002516 (Municipal and Police Building) was also, serviced by South Jersey Gas Company. Based on review of the charges, CEG has noted that there is some question as to the elevated Distribution Costs / Therm, for the months of July through September.

Recommendations:

CEG recommends Manchester schedule a meeting with their current utility providers in order to review their utility charges and current tariff structures for electricity and natural gas. This meeting will be both insightful and beneficial for the Owner as they can determine the details of their charges in addition to assessing the possibility of a custom rate structure with the utility in order to lessen energy costs. CEG can provide assistance to the Owner if this is a route they choose as services separate from this project.

Potential Savings from Third Party Suppliers:

Electricity:

The most noticeable observations recognized in this exercise were regarding commodity pricing. The average price / kWh (kilowatt hour) for each account reviewed is listed below:

Table 13
Average Price / kWh per Account

ACCOUNT NO.	PRICE / KWH
10 00 21 3823 02	$0.17 / kWh
10 00 21 3823 44	$0.1637 /kWh
10 00 21 3823 83	$0.1635 /kWh

While the consumption for these accounts is not very large, thus GS - General Service tariff structure, the price of the commodity ($/kWh) is substantially higher than market. CEG believes that there is an opportunity to reduce Manchester's total electric costs by up to 30% if aggregated with other accounts. This can be achieved through the utilization of third party suppliers and further negotiation with the current utility suppliers.

Natural Gas:

Based on the tariff analysis and utility bill review, it is unclear if Manchester is currently utilizing a Third Party supplier for natural gas. Based on spot market natural gas costs, Manchester is currently paying approximately 45%. Below is a listing of the average natural gas cost per therm per account:

Table 14
Average Price / Therm per Account

ACCOUNT NO.	PRICE / THERM
094650002516	$1.78 / Therm

Although Manchester's natural gas consumption is low, through aggregation CEG believes that this average natural gas price can be lowered substantially if the Owner would like to venture into a third-party agreement for a fixed term.

Recommendations:

CEG recommends Manchester review the utilization of third party suppliers to obtain rates below what their current suppliers are offering. However, as noted above due to Manchester's low consumption, aggregation with other users would need to be utilized to achieve the lower rates. CEG can provide assistance to the Owner if this is a route they choose as services separate from this project.

IX. METHOD OF ANALYSIS

The first step in the energy analysis is the site survey. The auditor surveys the entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed using engineering calculations; Microsoft Excel spread sheets and Trane Trace 700™ building simulation software that calculate the anticipated energy usage. The actual energy usage is entered directly from the utility bills. The anticipated energy usage is compared to the actual usage. If necessary, corrections are made to the site-collected data until the anticipated energy usage matches the actual usage. This process develops an end-use baseline for all of the fuels used at the facility. This baseline is used to calculate the energy savings for the measures that are recommended in this report.

The savings in this report are not duplicative. The savings for each recommendation may actually be higher if the individual recommendations were installed instead of the entire project. For example, the lighting module calculates the change in wattage and multiplies it by the new operating hours instead of the existing operating hours (if there was a change in the hours at all). The lighting controls module calculates the change in hours and multiplies it by the new system wattage instead of the existing wattage. Therefore, if you chose to install the recommended lighting system but not the lighting controls, the savings achieved with the new lighting system would actually be higher because there would have been no reduction in the hours of use.

The same principal follows for heating, cooling, and temperature recommendations – even with fuel switching. If there are recommendations to change the temperature settings to reduce fuel use, then the savings for the heating/cooling equipment recommendations are reduced, as well.

Our thermal module calculates the savings for temperature reductions utilizing Trane Trace 700™ building simulation software. The savings are calculated in "output" values – meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel.

Thermal recommendations (insulation, windows, etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the "thermal load" is the thermal load after the other recommendations have been accounted for.

Lastly, installation costs are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers.

X. ADDITIONAL RECOMMENDATIONS

Based on CEG's survey and assessment of the operation of the equipment within the facility, additional recommendations are warranted for this project. These recommendations are solely based on the fact that the equipment is either antiquated or not functioning as intended by the original engineering design. Going forward with the following recommendations could show the Owner some energy savings, but the ultimate goal is to place the equipment into proper operation.

A. Courtroom AHU Replacement: CEG recommends replacement of the three (3) Air Handling Units serving the first floor courtroom and common areas, along with new programmable thermostats. The air handling units are far past their useful life and are not functioning as required by the Owner. By replacing the air handling units the Owner will realize better comfort within these spaces.

B. Building DDC Control System: CEG recommends the Owner investigate further into the application of global controls for the Packaged Terminal Air Conditioning and Heating units. This will help reduce utility consumption in the unoccupied hours of operation.

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. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.

D. Repair/replace piping and ductwork insulation in the attic spaces.

E. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc. During the site survey, many areas were measured at over 100 foot candles.

F. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.

G. Recalibrate existing sensors serving the three air handling units (Carrier), sensors are currently ~ 10°F off desired setpoint.

H. Install a Vending Miser system to turn off vending machines when not in use.

I. Efficient parking lot lighting fixtures can reduce the energy use on the site without compromising safety or illumination. "Hockey puck" fixtures which use 175-Watt metal

halide lamps use 70% less electricity than "cobra head" fixtures using 250-watt high pressure sodium lamps.

J. Clean all fixtures to maximize light output.

K. Feel for air drafts around electrical outlets. Inexpensive pads are available, as are plugs for unused sockets.

L. Confirm that outside air economizers on the air handling units are functioning properly to take advantage of free cooling.

M. Various water conservation measures can be found in Appendix F.

XI. FINANCIAL SUMMARY

Life cycle costing (LCC) is an integral part to energy auditing. The applicable costs reviewed in completing a life cycle costing analysis are as follows: utility costs, installation costs, maintenance costs, and equipment replacement costs. The NIST-BLCC 5.3™ program determines operation costs based on the energy use of the building systems (HVAC, lighting, etc.) in conjunction with the utility, installation and maintenance costs. The NIST-BLCC software is endorsed by the Federal Energy Management Program and is the approved software for all federal life cycle costing analysis. When calculating the LCC of a respective ECM, recurring costs for existing HVAC equipment replacement play a major role. The delineation of the respective costs is as follows:

Utility Rates

The utility rates for electric and natural gas are as noted in Part III of this report.

Installed Costs – Construction Cost Estimate

The installed costs for the energy conservations measures have been completed utilizing RS Means estimating software, engineering estimates and contractor pricing. The costing is as follows:

Table 15
Installed Costs – Construction Cost Estimate per ECM

ECM NO.	DESCRIPTION	INSTALLED COST
1	Lighting Upgrade	$8,200
2	Lighting Controls	$2,640
3	Building Envelope Improvements	$112,500
4	Replace HHW Boilers	$61,879
5	Replace DHW Boiler	$9,011
6	Replace Condensing Units	$29,880
7	Programmable Thermostats	$1,600
8	Premium Efficiency Motors	$4,315

Some initial cost can be avoided by utilizing the New Jersey SmartStart Financial Incentive program (www.njsmartbuildings.com). The program offers financial incentives on various types of building equipment. Incentives were utilized in CEG's Life Cycle Costing calculations detailed in the financial analysis, Appendix G. A detailed list of the various incentives included within the SmartStart program can be found in Appendix H.

Maintenance Costs

Maintenance costs are based on a variety of variables and are difficult to calculate, therefore it is an industry practice to develop these costs based on the methods established in ASHRAE Applications Handbook 2007, Chapter 36 or to estimate the numbers based on ASHRAE Research Data issued in peer-reviewed journals. The following are the estimated maintenance costs utilized in this analysis:

Table 16
Maintenance Costs per ECM

ECM NO.	DESCRIPTION	MAINTENANCE COST
1	Lighting Upgrade	$ 15,084
2	Lighting Controls	15,084
3	Building Envelope Improvements	15,084
4	Replace HHW Boilers	13,724
5	Replace DHW Boiler	15,084
6	Replace Condensing Units	15,084
7	Programmable Thermostats	15,084
8	Premium Efficiency Motors	15,084

Recurring Costs – Equipment Replacement Costs

HVAC Equipment Replacement Costs are calculated utilizing the installation costs estimated by the cost consultant with an estimated inflation rate (approx. 1.9%) for the time of the study life that the replacement occurs. The recommended service life per ASHRAE Applications Handbook 2007, Chapter 36 has been used as the basis for the analysis software to determine equipment replacement frequency for the 20 year Life Cycle Cost Analysis. Refer to Appendix G for a listing of the recurring / replacement costs per ECM.

Economic Parameters

The LCC analysis was performed using a 20-year Study Life with a Cost of Capital equal to 5%. The project was not modeled as being financed because the project is privately funded. The utility costs, maintenance and replacement costs incorporate a 1.9% average long-term inflation rate calculated annually for the DOE/FEMP projects according to 10 CFR 436. Depending on any unforeseen changes in rate structure by the utility providers, this inflation rate is likely to increase.

The results of the LCC analysis are as follows:

Table 17
Life Cycle Analysis Summary

ECM NO.	DESCRIPTION	PROJECT COST	ANNUAL SAVINGS	LIFE CYCLE PAYBACK (YEAR)
1	Lighting Upgrade	$ 18,105	$31,036	1
2	Lighting Controls	3,600	$376	4
3	Building Envelope Improvements	112,500	$4,754	N/A
4	Replace HHW Boilers	64,000	$461	5
5	Replace DHW Boiler	9,510	$633	6
6	Replace Condensing Units	32,070	$2,777	2
7	Programmable Thermostats	1,600	$381	3
8	Premium Efficiency Motors	$4,475	$782	6
Totals		**$245,860**	**$41,200**	

Refer to Appendix G for the financial summary.

XII. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the Owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

A. *Performance Contracting* – Performance Contracting is an agreement between a local government and a private energy services company (ESCO) that uses future energy savings to pay for the entire cost of a building's energy efficiency retrofits/upgrades. A local government contracts with an ESCO, then the ESCO purchases, installs and maintains energy-saving equipment. According to State Assembly Bill # 1185, a local government may enter into guaranteed energy savings contracts within a 15-year period. An independent energy auditor must prepare the investment grade audit and perform the measurement/verification of the savings.

B. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

C. *County Improvement Authority* – Several local governments in New Jersey have received funding for energy projects through their County Improvement Authority.

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

Police Station
JCP&L - General Service
Secondary 3 Phase
Account # 10 00 21 3823 02
Meter # G17995283

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	36,800	38,720	38,560	34,080	36,800	39,520	60,480	55,680	50,720	46,800	42,880	36,000	517,040	
KW	85	85	103	93	145	197	137	135	140	121	101	97	197	Max
Monthly Load Factor	58%	68%	50%	51%		28%	59%	55%	50%		59%	50%	53%	
Electric Delivery, $	$ 1,679	$ 1,733	$ 1,847	$ 1,645		$ 2,857	$ 2,805	$ 2,650	$ 2,523		$ 2,001		$19,741	
Delivery $/kwh	$0.046	$0.045	$0.048	$0.048		$0.072	$0.046	$0.048	$0.050		$0.047	$0.000	$0.038	
Electric Supply, $	$ 3,804	$ 3,991	$ 3,770	$ 3,255		$ 6,892	$ 7,832	$ 7,210	$ 6,358		$ 4,523		$47,634	
Supply $/kwh	$0.103	$0.103	$0.098	$0.096		$0.174	$0.129	$0.129	$0.125		$0.105	$0.000	$0.092	
Total Cost, $	$5,483	$5,724	$5,617	$4,900	$7,325	$9,749	$10,638	$9,861	$8,881	$7,702	$6,523	$5,732	$67,375	
$/KWH	$0.1490	$0.1478	$0.1457	$0.1438	$0.1990	$0.2467	$0.1759	$0.1771	$0.1751	$0.1646	$0.1521	$0.1592	$0.1303	

831,440

Municipal Office/Court Building
JCP&L - General Service
Secondary 3 Phase
Account # 10 00 21 3823 44
Meter # G28408020

***Areas in yellow are estimated values due to missing utility information.

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	365	
KWH	24,360	25,800	24,360	24,480	27,600	22,320	32,520	30,000	28,920	24,840	25,680	23,520	314,400	
KW	54	66	55	67	73	84	80	76	76	63	64	62	84	Max
Monthly Load Factor	60%	58%	60%	51%	51%	37%	55%	53%	53%	53%	56%	51%	53%	
Electric Delivery, $	$ 1,096	$ 1,217	$ 1,100	$ 1,179	$ 1,318	$ 1,527	$ 1,548	$ 1,444	$ 1,409	$ 1,169	$ 1,220	$ 1,138	$15,367	
Delivery $/kwh	$0.045	$0.047	$0.045	$0.048	$0.048	$0.068	$0.048	$0.048	$0.049	$0.047	$0.048	$0.048	$0.049	
Electric Supply, $	$ 2,518	$ 2,659	$ 2,381	$ 2,338	$ 2,636	$ 3,888	$ 4,211	$ 3,885	$ 3,624	$ 2,618	$ 2,708	$ 2,597	$36,065	
Supply $/kwh	$0.103	$0.103	$0.098	$0.096	$0.096	$0.174	$0.129	$0.129	$0.125	$0.105	$0.105	$0.110	$0.115	
Total Cost, $	$3,614	$3,876	$3,481	$3,518	$3,955	$5,416	$5,759	$5,329	$5,033	$3,787	$3,929	$3,736	$51,432	
$/KWH	$0.1484	$0.1503	$0.1429	$0.1437	$0.1433	$0.2426	$0.1771	$0.1776	$0.1740	$0.1525	$0.1530	$0.1588	$0.1636	

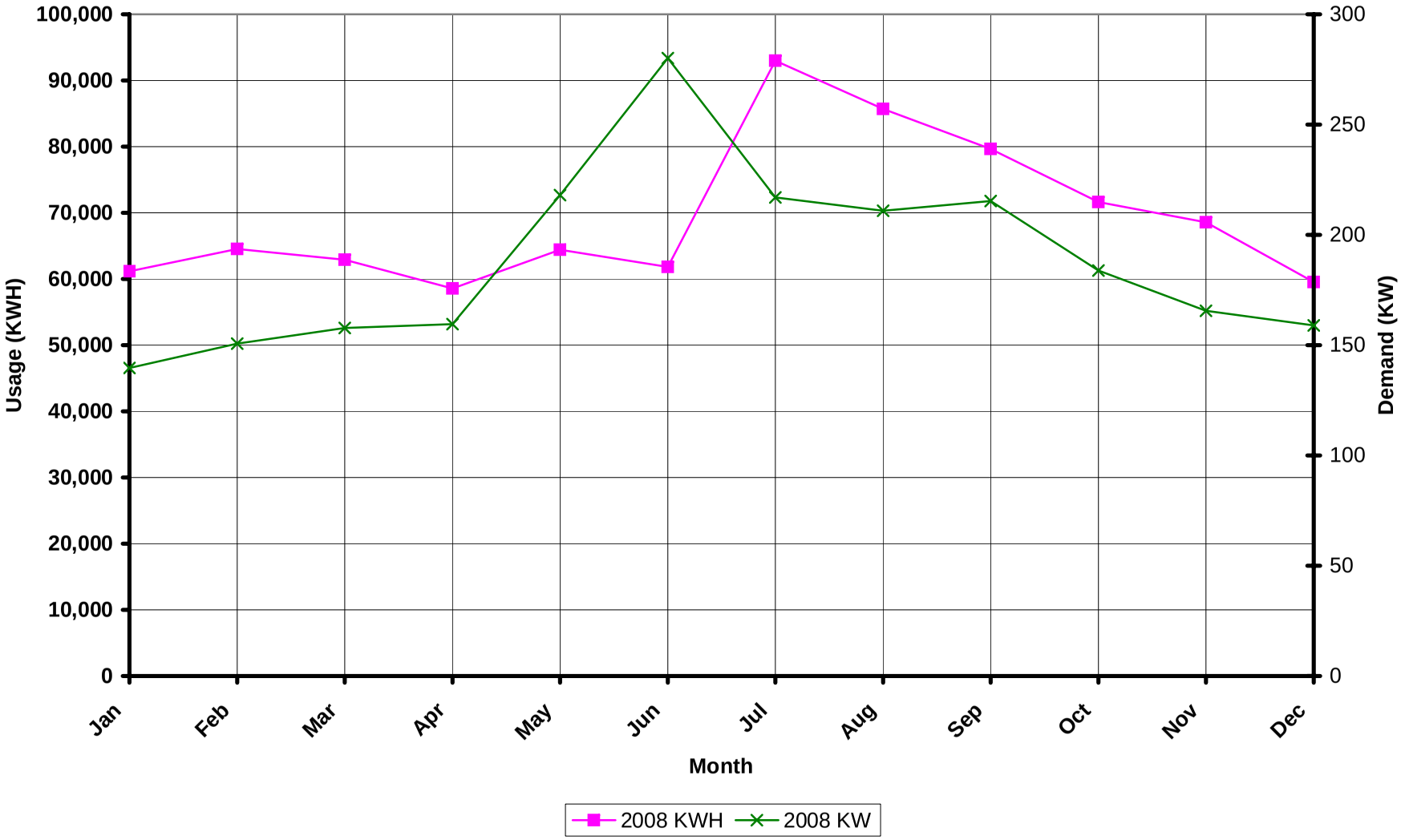
Municipal and Police Building - Sum of Municipal Building and Police Station Usage

	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Totals
KWH	61,160	64,520	62,920	58,560	64,400	61,840	93,000	85,680	79,640	71,640	68,560	59,520	831,440
KW	140	151	158	160	218	280	217	211	215	184	166	159	280
Total Cost $	$9,097	$9,600	$9,098	$8,418	$11,279	$15,165	$16,397	$15,189	$13,914	$11,489	$10,452	$9,468	$139,565

Public Works Garage
JCP&L - General Service
Secondary 3 Phase
Account # 10 00 19 6913 83
Meter # G17995257

Month	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total	
Billing Days	31	28	31	30	31	30	31	31	30	31	30	31	0	
KWH	25,000	33,250	15,360	14,520	5,320	9,000	9,880	8,680	7,640	7,520	13,960		150,130	
KW		66	64	44	40		56	56	56	66	41		66	Max
Monthly Load Factor	#DIV/0!	75%	33%	46%	18%	#DIV/0!	24%	21%	19%	15%	47%	#DIV/0!	#DIV/0!	
Electric Delivery, $	$ -	$ 1,446	$ 881	$ 726	$ 420		$ 549	$ 512	$ 480		$ 704		$5,718	
Delivery $/kwh	$0.000	$0.043	$0.057	$0.050	$0.079	$0.000	$0.056	$0.059	$0.063	$0.000	$0.050	#DIV/0!	$0.038	
Electric Supply, $		$ 3,426	$ 1,483	$ 1,387	$ 508		$ 1,279	$ 1,124	$ 951		$ 1,472		$11,630	
Supply $/kwh	$0.000	$0.103	$0.097	$0.096	$0.096	$0.000	$0.129	$0.129	$0.124	$0.000	$0.105	#DIV/0!	$0.077	
Total Cost, $	$0	$4,872	$2,364	$2,112	$928		$1,828	$1,636	$1,431	$1,265	$2,177	$0	$17,348	
$/KWH	$0.0000	$0.1465	$0.1539	$0.1455	$0.1744	$0.0000	$0.1851	$0.1885	$0.1873	$0.1682	$0.1559	#DIV/0!	$0.1156	

Police and Municipal Building Electric Usage Profile
January through December of 2008



Summary of Natural Gas Cost
South Jersey Gas and South Jersey Energy

Municipal Building & Police Station

	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Total
Account# 094650002516	31	28	31	30	31	30	31	31	30	31	30	31	
Meter# 678195													
Meter 337507													
Total MCF													0
BTU Factor													0
Therms (Burner Tip)	3,083	3,534	3,138	2,201	1,341	864	582	858	482	832	2,437	0	19,350
Total Distribution Cost	$1,208	$1,240	$1,152	$943	$752	$646	$583	$644	$561	$666	$1,096		9,491
Cost per Therm	$0.392	$0.351	$0.367	$0.429	$0.561	$0.748	$1.002	$0.752	$1.164	$0.801	$0.450	#DIV/0!	$0.491
Total Commodity Cost	$3,334	$3,519	$3,349	$2,046	$1,229	$799	$529	$717	$365	$701	$2,268		18,857
Cost per Therm	$1.08	$1.00	$1.07	$0.93	$0.92	$0.93	$0.91	$0.84	$0.76	$0.84	$0.93	#DIV/0!	$0.97
Total Cost	$4,542	$4,759	$4,501	$2,990	$1,980	$1,445	$1,112	$1,362	$926	$1,367	$3,364	$0	$28,348
Cost per Therm	$1.47	$1.35	$1.43	$1.36	$1.48	$1.67	$1.91	$1.59	$1.92	$1.64	$1.38	#DIV/0!	$1.47

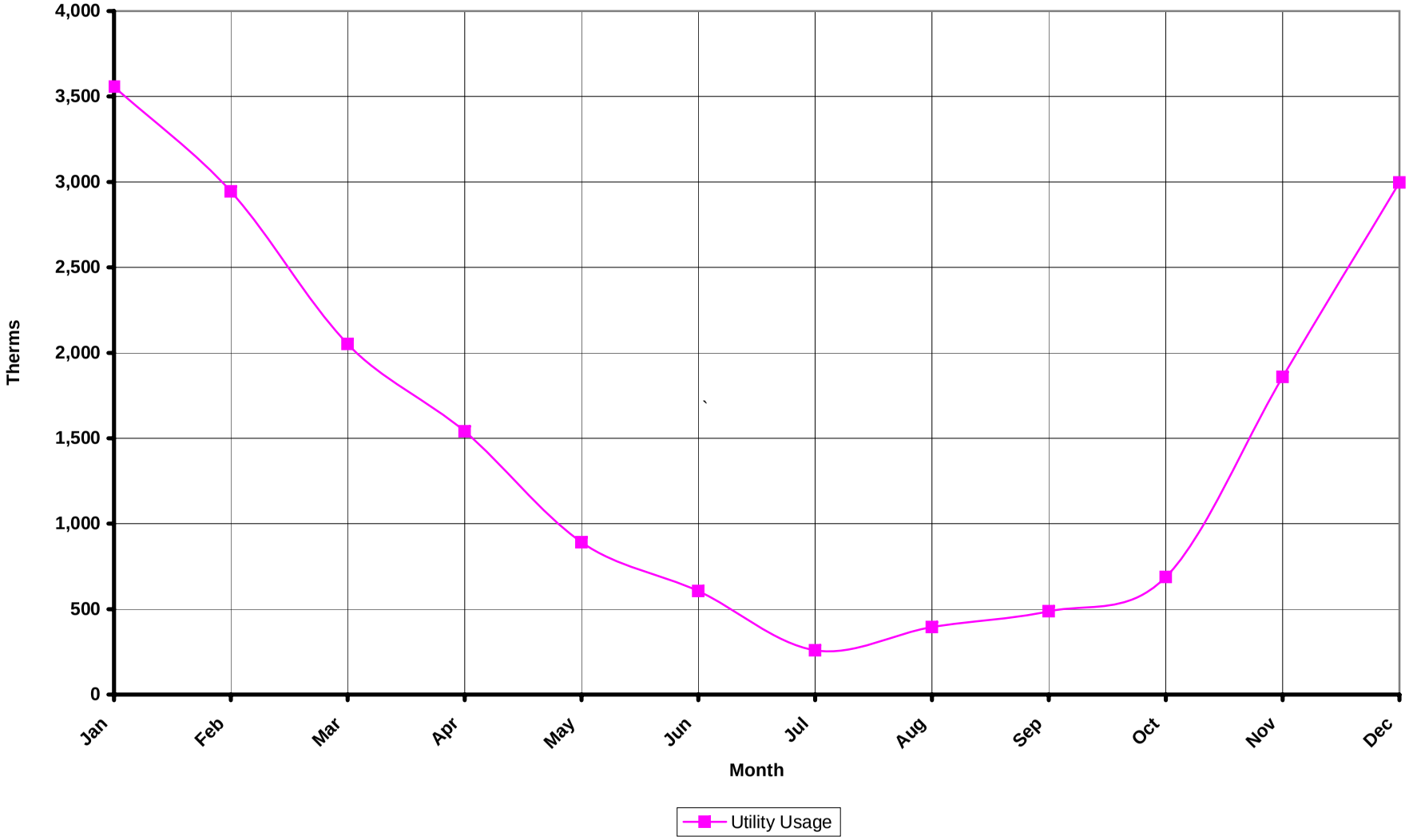
Summary of Natural Gas Cost
South Jersey Gas and South Jersey Energy

Municipal Building & Police Station

	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total
Account# 094650002516	31	28	31	30	31	30	31	31	30	31	30	31	
Meter# 678195													
Meter 337507													
Total MCF	3,557	2,944	2,052	1,540	891	605	259	395	488	688	1,859	2,997	18,274
BTU Factor		1.05	1.05	1.05	1.05	1.04	1.05	1.05	1.05	1.05			9
Therms (Burner Tip)	3,557	3,079	2,146	1,611	931	632	271	415	511	720	0	2,997	16,871
Total Distribution Cost	$1,391	$4,463	$1,041	$887	$704	$624	$527	$566	$592	$640			11,435
Cost per Therm	$0.391	$1.449	$0.485	$0.551	$0.757	$0.988	$1.942	$1.364	$1.157	$0.888	#DIV/0!	$0.000	$0.678
Total Commodity Cost	$3,323		$2,393	$1,960	$1,199	$931	$419	$694	$765	$578	$3,081	$3,218	18,561
Cost per Therm	$0.93	$0.00	$1.11	$1.22	$1.29	$1.47	$1.54	$1.67	$1.50	$0.80	#DIV/0!	$1.07	$1.10
Total Cost	$5,229	$4,463	$3,434	$2,848	$1,903	$1,555	$946	$1,260	$1,357	$1,218	$2,695	$4,196	$31,102
Cost per Therm	$1.47	$1.45	$1.60	$1.77	$2.04	$2.46	$3.48	$3.04	$2.65	$1.69	#DIV/0!	$1.40	$1.84

***Areas in yellow are estimated values due to missing utility information.

Municipal and Police Building Gas Usage
January through December of 2008



EXISTING EQUIPMENT LIST

Concord Engineering Group

BOILERS

Location	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Output (MBh)	Vintage	Efficiency (%)	Fuel
Police Building - B026	H.B. Smith	1	CCC-10-W	29607800-R	675	540	1996	80%	Nat. Gas
Municipal Building - B044	Hydrotherm	8	MR-2400B		300	234		78%	Nat. Gas

Boiler - Pumps

Location	Manufacturer	Qty.	Model #	Serial #	HP	RPM	Vintage	Volts	Amps
Police Building - B026		2			0.75				
Police Building - B026		1			smaller pump				
Municipal Building - B044 - Incremental East		1			1	1725		200	4.4
Municipal Building - B044 - #1 & 3 East		1			0.75	1725		200	3.4
Municipal Building - B044 - Cellar East		1			0.75	1725		200	2.5
Municipal Building - B044 - West Incrementals		1			1	1725		200	4.2
Municipal Building - B044 - Coil #2 & 4 West		1			1	1725		200	4.2
Municipal Building - B044 - Standby Pump		1			1.5	1725		200	5.8

Domestic Hot Water Heater

Location	Manufacturer	Qty.	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Vintage	Fuel
Police Building - B026	AO Smith	1	BTC197-964	MM96-0009764-964	197	179.1	100		1996	Nat. Gas
Municipal Building - B044	RHEEM	1	RFD300-92	8884001	300	272.7	92		1988	Nat. Gas
Municipal Garage	AO Smith	1			4500 Watts		40			Elec.

DHW - Pumps

Location	Manufacturer	Qty.	Model #	Serial #	HP	Volts	Amps
Police Building - B026		1			0.25		
Municipal Building - B044		1				115	0.74

Air Handling Units

Location	Manufacturer	Qty.	Model #	Serial #	Cooling Coil	Heating Coil	Input (MBh)	Output (MBh)	Fan HP	Fan RPM	Volts	Phase	Amps	Notes	Vintage
Municipal Building - Attic	Nesbitt	2	22642	AL-C-4F	DX	HW	-	-	1.5	1725	120	3	50	Only OA Duct is insulated. Units serve the Court room	
Municipal Building - Attic		1			DX	HW	-	-	1		240		3.4	Unit Servers office area adjacent to court room. Possible need for asbestos abetment upon removal of unit.	
Municipal Building - Basement	Carrier Weather Maker	1	40RR-014-530		DX	HW	-	-	2 @1.49kW		208	3	60	Mounted Vertically	
Police Building - Attic	AHU 3&4 - Carrier Weather Maker	2	40RR-014-530		DX	HW	-	-	2 @1.49kW		208	3	60	Hung From Ceiling.	
Municipal Garage		2	LOTDM 150 C-LH	74-16752-F0-1999	-	Oil Furnace	1875	1500	7.5 Supply 1.5 Exhaust		200		23/5.5	Units are heating oil and burn fuel oil #2.	1974

Exhaust Fans

Location	Manufacturer	Qty.	Model #	Serial #	Fan HP	Fan RPM	Volts	Phase	Amps	Notes
Municipal Building - Attic	ILG Industries	1			3/8	1140	115	1	4.4	
Municipal Building - Attic		2			1/12					One fan not in use.

Split Systems and AC Condensers

Location	Manufacturer	Qty.	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Amps	Notes
Outside Muni - 1	Sanyo	1	C42-32				R-22	208-230	1		
Outside Muni - 2	Carrier	1	38AE014-500					208	2		Most likely serves Vertical AHU in basement.
Outside Muni - 3	Sanyo	1	C42-32								
Outside Muni - 4	Thermal Zone		MS29A13115CA		9000 BTu	13 SEER		115	1	60	
Outside Muni - 5	Sanyo	1	C0911		9000 BTu						Indoor side are KS models.
Outside Muni - 6	Sanyo	1	C0911		9000 BTu						Indoor side are KS models.
Outside Muni - 7	Sanyo	1	C0911		9000 BTu						Indoor side are KS models.
Outside Muni - 8	Carrier	1	38AE-014-500		70MCA			208	3		
Outside Muni - 9	Sanyo	1	C0911		9000 BTu						Indoor side are KS models.
Outside Muni - 10	Sanyo	1	CH3642								
Outside Muni - 11	Sanyo	1	CH3642								
Outside Muni - 12	Sanyo	1	C0951								
Outside Muni - 13	Sanyo	1	C1251		11800 Btu						
Outside Police - 14	International Comfort Products	1	CAE120HAA		10 Ton	10.3 EER	R-22	230/460	3	60	
Outside Police - 15	International Comfort Products	1	CAE120HAA		10 Ton	10.3 EER	R-22	230/460	3	60	
Outside Police - 16	York	1	H1CE180A25B								15Hp Compressor 59.6 RLA - x2-1hp fans 4.2 FLA
Outside Police - 17	International Comfort Products	1	N2A060A4A2		5 Ton	10 SEER	R-22	208/230-460	3		
Outside Police - 18	Sanyo	1	CL4232								
Outside Police - 19	International Comfort Products	1	CAE180HAA								
Outside Police - 20	Carrier	1	38QH036310		3 Ton	9.5 SEER					
Outside Police - 21	Mitsubishi	1	P436EK								
Outside Police - 22	Arcoaire	1	NAC024AKC3								
Outside Police - 23	Sanyo	1	C3032A								

PTAC - Units

Location	Manufacturer	Qty.	Model #	Serial #	MFG #	Cooling Capacity - DX	Heating Capacity - HW	Fan HP	Volts	Phase	Amps	Notes
Municipal/Police	Amana	65	PTC 153A00HD	210127563	P1225449R	14200 Btu/h	14000 Btu/h	1/15			6.3/6.9	Old Units
Police - Only	Carrier	6	52CEA312301AA			11,900 Btu/h	2.8kW/3.4kW	1/8	208/230			Carrier comfort series. Only a few of these units.

INVESTMENT GRADE LIGHTING AUDIT

CONCORD ENERGY GROUP

CEG Job #: 9C08129
Project: Manchester Twp. Energy Audit
Address: 1Colonial Dr., Manchester, NJ, 08759
City: Manchester Township
Building SF: 45710 sf 3-Story

DATE: 03/09/2009
KWH COST: **$0.160**
Retro Fit Cost Per Fixture: **$29.36**

EXISTING LIGHTING											PROPOSED LIGHTING							SAVINGS			
Line No.		Fixture Location	No. eFixts	Fixture eType	Yearly Usage	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. rFixts	Retro-Unit rDescription	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Monthly Payback
1		B001	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
2		B002	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
3		B003	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
4		B004	12	2x2 4 lamp T-12	2250	168	2.02	4536	$725.76	12	3 Lamp T-8 GE-332	47	0.56	1269	$203.04	$29.36	$352.35	1.45	3267	$522.72	8.09
5		B005	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
6		B006	10	2x4 4 lamp T-12	2250	168	1.68	3780	$604.80	10	3 Lamp T-8 GE-332	75	0.75	1687.5	$270.00	$29.36	$293.62	0.93	2092.5	$334.80	10.52
7		B007	11	2x4 4 lamp T-12	2250	168	1.85	4158	$665.28	11	3 Lamp T-8 GE-332	75	0.83	1856.25	$297.00	$29.36	$322.99	1.02	2301.75	$368.28	10.52
8		B008	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
9		B009 - Restroom	1	2x4 4 lamp T-12	6240	168	0.17	1048.32	$167.73	1	3 Lamp T-8 GE-332	75	0.08	468	$74.88	$29.36	$29.36	0.09	580.32	$92.85	3.79
10			1	2x2 4 lamp T-12	6240	168	0.17	1048.32	$167.73	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.12	755.04	$120.81	2.92
11		B010	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
12		B011	1	1 incandescent porcelain	800	60	0.06	48	$7.68	1	Eiko-13w mini sprial	13	0.01	10.4	$1.66	$1.99	$1.99	0.05	37.6	$6.02	3.97
13		B012 - Corridor	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	81	0.16	1010.88	$161.74	$29.36	$58.72	0.17	1085.76	$173.72	4.06
14		B013 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
15		B014 - Restroom	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	75	0.15	936	$149.76	$29.36	$58.72	0.19	1160.64	$185.70	3.79
16		B015	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
17		B016	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
18		B017	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
19		B018	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
20		B019	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
21		B020	8	2x4 4 lamp T-12	2250	168	1.34	3024	$483.84	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.74	1674	$267.84	10.52
22		B023	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
23		B024 - Corridor	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	81	0.16	1010.88	$161.74	$29.36	$58.72	0.17	1085.76	$173.72	4.06
24		B025	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
25		B026	4	4' - 2 lamp T-12	2250	84	0.34	756	$120.96	4	3 Lamp T-8 GE-332	37	0.15	333	$53.28	$29.36	$117.45	0.19	423	$67.68	20.82
26		B027 - Corridor	3	2x4 4 lamp T-12	6240	168	0.50	3144.96	$503.19	3	3 Lamp T-8 GE-332	81	0.24	1516.32	$242.61	$29.36	$88.09	0.26	1628.64	$260.58	4.06
27		B028	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
28		B029	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
29		B039	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
30		B040	2	4' - 2 lamp T-12	2250	84	0.17	378	$60.48	2	3 Lamp T-8 GE-332	37	0.07	166.5	$26.64	$29.36	$58.72	0.09	211.5	$33.84	20.82
31		B067	2	2x2 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52

32		B022	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
33		B030	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
34		B031	1	1 incandescent porcelain	800	60	0.06	48	$7.68	1	Eiko-13w mini spiral	13	0.01	10.4	$1.66	$1.99	$1.99	0.05	37.6	$6.02	3.97
35		B032	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
36		B033	6	2x4 2 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
37		B034	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
38		B035	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
39		B036	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
40		B037	9	2x4 4 lamp T-12	2250	168	1.51	3402	$544.32	9	3 Lamp T-8 GE-332	75	0.68	1518.75	$243.00	$29.36	$264.26	0.84	1883.25	$301.32	10.52
41		B038	18	2x4 4 lamp T-12	2250	168	3.02	6804	$1,088.64	18	3 Lamp T-8 GE-332	75	1.35	3037.5	$486.00	$29.36	$528.52	1.67	3766.5	$602.64	10.52
42		B041 - Corridor	6	2x4 4 lamp T-12	6240	168	1.01	6289.92	$1,006.39	6	3 Lamp T-8 GE-332	81	0.49	3032.64	$485.22	$29.36	$176.17	0.52	3257.28	$521.16	4.06
43		B042	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.01	20.25	$3.24	108.75
44		B044	9	4' - 2 lamp T-12	2250	84	0.76	1701	$272.16	9	3 Lamp T-8 GE-332	75	0.68	1518.75	$243.00	$29.36	$264.26	0.08	182.25	$29.16	108.75
45		B045	1	2x4 4 lamp T-12	2250	164	0.16	369	$59.04	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	200.25	$32.04	11.00
46		B047	8	2x4 4 lamp T-12	2250	164	1.31	2952	$472.32	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.71	1602	$256.32	11.00
47		B048	3	2x4 4 lamp T-12	2250	164	0.49	1107	$177.12	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.27	600.75	$96.12	11.00
48		B049 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
49		B050 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
50		B051	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
51		B052	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
52		B054	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
53		B055	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
54		B056	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
55		B057 - Jan. Closet	1	1 incandescent porcelain	800	60	0.06	48	$7.68	1	Eiko-13w mini spiral	13	0.01	10.4	$1.66	$1.99	$1.99	0.05	37.6	$6.02	3.97
56		B058	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
57		B059 - Corridor	12	2x4 4 lamp T-12	6240	168	2.02	12579.8	$2,012.77	12	3 Lamp T-8 GE-332	81	0.97	6065.28	$970.44	$29.36	$352.35	1.04	6514.56	$1,042.33	4.06
58		B060	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
59		B061	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
60		B062	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
61		B063	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
62		B064	8	2x4 4 lamp T-12	2250	168	1.34	3024	$483.84	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.74	1674	$267.84	10.52
63		B065	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
64		1001	15	2x4 4 lamp T-12	2250	168	2.52	5670	$907.20	15	3 Lamp T-8 GE-332	75	1.13	2531.25	$405.00	$29.36	$440.44	1.40	3138.75	$502.20	10.52
65		1005	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
66		1006	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
67		1007	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
68		1008	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
69		1009	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
70		1010 - Corridor	17	2x4 4 lamp T-12	6240	168	2.86	17821.4	$2,851.43	17	3 Lamp T-8 GE-332	81	1.38	8592.48	$1,374.80	$29.36	$499.16	1.48	9228.96	$1,476.63	4.06
71		1011	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
72		1012	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
73		1013 - Restroom	3	2x4 4 lamp T-12	6240	168	0.50	3144.96	$503.19	3	3 Lamp T-8 GE-332	75	0.23	1404	$224.64	$29.36	$88.09	0.28	1740.96	$278.55	3.79
74		1014	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
75		1015 - Restroom	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	75	0.15	936	$149.76	$29.36	$58.72	0.19	1160.64	$185.70	3.79
76		1016	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
77		1017 - Restroom	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54

78		1018 - Restroom	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
79		1020	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
80		1021	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
81		1022	7	2x4 4 lamp T-12	2250	168	1.18	2646	$423.36	7	3 Lamp T-8 GE-332	75	0.53	1181.25	$189.00	$29.36	$205.54	0.65	1464.75	$234.36	10.52
82		1024	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
83		1025	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
84		1026 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
85		1027	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
86		1028	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
87		1029	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
88		1030	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
89		1035 - Corridor	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	81	0.16	1010.88	$161.74	$29.36	$58.72	0.17	1085.76	$173.72	4.06
90		1036	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
91		1037 - Holding Cells	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
92		1038	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
93		1039	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
94		1040 - Corridor	4	2x4 4 lamp T-12	6240	168	0.67	4193.28	$670.92	4	3 Lamp T-8 GE-332	81	0.32	2021.76	$323.48	$29.36	$117.45	0.35	2171.52	$347.44	4.06
95		1041 - Restroom	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
96		1042	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
97		1043	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
98		1044	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
99		1045	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
100		1048 - Court Room																			
101		1049	12	2x2 4 lamp T-12	2250	84	1.01	2268	$362.88	12	3 Lamp T-8 GE-332	47	0.56	1269	$203.04	$29.36	$352.35	0.44	999	$159.84	26.45
102		1050	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
103		1051	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
104		1052 - Corridor	3	2x4 4 lamp T-12	6240	168	0.50	3144.96	$503.19	3	3 Lamp T-8 GE-332	81	0.24	1516.32	$242.61	$29.36	$88.09	0.26	1628.64	$260.58	4.06
105		1053	13	2x4 4 lamp T-12	2250	168	2.18	4914	$786.24	13	3 Lamp T-8 GE-332	75	0.98	2193.75	$351.00	$29.36	$381.71	1.21	2720.25	$435.24	10.52
106		1054 - Corridor	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	81	0.16	1010.88	$161.74	$29.36	$58.72	0.17	1085.76	$173.72	4.06
107		1055	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
108		1057	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
109		1058	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
110		1059	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
111		1060 - Lobby	12	2x2 4 lamp T-12	2250	84	1.01	2268	$362.88	12	3 Lamp T-8 GE-332	47	0.56	1269	$203.04	$29.36	$352.35	0.44	999	$159.84	26.45
112		1063	4	2x4 LED Light	2250	15	0.06	135	$21.60		No Replacement										
113		1064	8	2x4 4 lamp T-12	2250	168	1.34	3024	$483.84	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.74	1674	$267.84	10.52
114		1065	7	2x4 4 lamp T-12	2250	168	1.18	2646	$423.36	7	3 Lamp T-8 GE-332	75	0.53	1181.25	$189.00	$29.36	$205.54	0.65	1464.75	$234.36	10.52
115		1068	14	2x4 4 lamp T-12	2250	168	2.35	5292	$846.72	14	3 Lamp T-8 GE-332	75	1.05	2362.5	$378.00	$29.36	$411.07	1.30	2929.5	$468.72	10.52
116		1070 - Stair	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
117		1071	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
118		1072	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
119		1074	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
120		1075	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
121		1076	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
122		1077 - Corridor	7	2x4 4 lamp T-12	6240	168	1.18	7338.24	$1,174.12	7	3 Lamp T-8 GE-332	81	0.57	3538.08	$566.09	$29.36	$205.54	0.61	3800.16	$608.03	4.06

123		1078	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
124		1079 - Corridor	14	2x4 4 lamp T-12	6240	168	2.35	14676.5	$2,348.24	14	3 Lamp T-8 GE-332	81	1.13	7076.16	$1,132.19	$29.36	$411.07	1.22	7600.32	$1,216.05	4.06
125		1080	6	2x4 3 lamp T-8	2250	84	0.50	1134	$181.44		No Replacement										
126		1081	8	2x4 3 lamp T-8	2250	84	0.67	1512	$241.92		No Replacement										
127		1082	4	2x4 4 lamp T-12	2250	168	0.67	1512	$241.92	4	3 Lamp T-8 GE-332	75	0.30	675	$108.00	$29.36	$117.45	0.37	837	$133.92	10.52
128		1083	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
129		1085	17	2x4 4 lamp T-12	2250	168	2.86	6426	$1,028.16	17	3 Lamp T-8 GE-332	75	1.28	2868.75	$459.00	$29.36	$499.16	1.58	3557.25	$569.16	10.52
130		1086	8	2x4 3 lamp T-8	2250	84	0.67	1512	$241.92		No Replacement										
131		2001	8	2x4 4 lamp T-12	2250	168	1.34	3024	$483.84	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.74	1674	$267.84	10.52
132		2002	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
133		2003	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
134		2004	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
135		2005	9	2x4 4 lamp T-12	2250	168	1.51	3402	$544.32	9	3 Lamp T-8 GE-332	75	0.68	1518.75	$243.00	$29.36	$264.26	0.84	1883.25	$301.32	10.52
136		2006	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
137		2007	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
138		2008 - Corridor	10	2x4 4 lamp T-12	6240	168	1.68	10483.2	$1,677.31	10	3 Lamp T-8 GE-332	81	0.81	5054.4	$808.70	$29.36	$293.62	0.87	5428.8	$868.61	4.06
139		2009 - Stair	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
140		2010 - Stair	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
141		2011	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
142		2012 - Restroom	2	2x4 4 lamp T-12	6240	168	0.34	2096.64	$335.46	2	3 Lamp T-8 GE-332	75	0.15	936	$149.76	$29.36	$58.72	0.19	1160.64	$185.70	3.79
143		2013	1	1 incandescent porcelain	2250	60	0.06	135	$21.60	1	Eiko-13w mini spiral	13	0.01	29.25	$4.68	$1.99	$1.99	0.05	105.75	$16.92	1.41
144		2014	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
145		2015 - Restroom	1	2x4 4 lamp T-12	6240	168	0.17	1048.32	$167.73	1	3 Lamp T-8 GE-332	75	0.08	468	$74.88	$29.36	$29.36	0.09	580.32	$92.85	3.79
146		2016 - Restroom	1	2x4 4 lamp T-12	6240	168	0.17	1048.32	$167.73	1	3 Lamp T-8 GE-332	75	0.08	468	$74.88	$29.36	$29.36	0.09	580.32	$92.85	3.79
147		2018	16	2x4 4 lamp T-12	2250	168	2.69	6048	$967.68	16	3 Lamp T-8 GE-332	75	1.20	2700	$432.00	$29.36	$469.80	1.49	3348	$535.68	10.52
148		2019	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
149		2020	10	2x4 4 lamp T-12	2250	168	1.68	3780	$604.80	10	3 Lamp T-8 GE-332	75	0.75	1687.5	$270.00	$29.36	$293.62	0.93	2092.5	$334.80	10.52
150		2021	2	High-hat incandescent	2250	60	0.12	270	$43.20	2	Eiko-13w mini spiral	13	0.03	58.5	$9.36	$1.99	$3.98	0.09	211.5	$33.84	1.41
151		2022	2	High-hat incandescent	2250	60	0.12	270	$43.20	2	Eiko-13w mini spiral	13	0.03	58.5	$9.36	$1.99	$3.98	0.09	211.5	$33.84	1.41
152		2023	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
153		2024 - Restroom	1	2x4 4 lamp T-12	6240	168	0.17	1048.32	$167.73	1	3 Lamp T-8 GE-332	75	0.08	468	$74.88	$29.36	$29.36	0.09	580.32	$92.85	3.79
154		2029	9	2x4 4 lamp T-8	2250	128	1.15	2592	$414.72		No Replacement										
155		2031	12	2x4 4 lamp T-8	2250	128	1.54	3456	$552.96		No Replacement										
156		2032	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
157		2033	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
158		2031	8	2x4 4 lamp T-8	2250	128	1.02	2304	$368.64		No Replacement										
159		2035	2	2x4 4 lamp T-8	2250	128	0.26	576	$92.16		No Replacement										
160		2036	8	2x4 4 lamp T-12	2250	168	1.34	3024	$483.84	8	3 Lamp T-8 GE-332	75	0.60	1350	$216.00	$29.36	$234.90	0.74	1674	$267.84	10.52
161		2037 - Corridor	7	2x4 4 lamp T-12	6240	168	1.18	7338.24	$1,174.12	7	3 Lamp T-8 GE-332	81	0.57	3538.08	$566.09	$29.36	$205.54	0.61	3800.16	$608.03	4.06
162		2039	1	2x4 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	75	0.08	168.75	$27.00	$29.36	$29.36	0.09	209.25	$33.48	10.52
163		2040	1	2x2 4 lamp T-12	2250	168	0.17	378	$60.48	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.12	272.25	$43.56	8.09
164		2041	1	1 incandescent porcelain	2250	60	0.06	135	$21.60	1	Eiko-13w mini spiral	13	0.01	29.25	$4.68	$1.99	$1.99	0.05	105.75	$16.92	1.41
165		2042	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45
166		2043	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
167		2044	1	2x2 4 lamp T-12	2250	84	0.08	189	$30.24	1	3 Lamp T-8 GE-332	47	0.05	105.75	$16.92	$29.36	$29.36	0.04	83.25	$13.32	26.45

168		2045 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
169		2046 - Stair	1	2x2 4 lamp T-12	6240	84	0.08	524.16	$83.87	1	3 Lamp T-8 GE-332	47	0.05	293.28	$46.92	$29.36	$29.36	0.04	230.88	$36.94	9.54
170		2047	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
171		2048	8	2x4 4 lamp T-8	2250	128	1.02	2304	$368.64		No Replacement										
172		2049	6	2x4 4 lamp T-12	2250	168	1.01	2268	$362.88	6	3 Lamp T-8 GE-332	75	0.45	1012.5	$162.00	$29.36	$176.17	0.56	1255.5	$200.88	10.52
173			2	2x4 4 lamp T-8	2250	128	0.26	576	$92.16		No Replacement										
174		2051	9	2x4 4 lamp T-12	2250	168	1.51	3402	$544.32	9	3 Lamp T-8 GE-332	75	0.68	1518.75	$243.00	$29.36	$264.26	0.84	1883.25	$301.32	10.52
175		2054	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
176		2055	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
177		2056	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
178		2057	3	2x4 4 lamp T-12	2250	168	0.50	1134	$181.44	3	3 Lamp T-8 GE-332	75	0.23	506.25	$81.00	$29.36	$88.09	0.28	627.75	$100.44	10.52
179		2058	2	2x4 4 lamp T-12	2250	168	0.34	756	$120.96	2	3 Lamp T-8 GE-332	75	0.15	337.5	$54.00	$29.36	$58.72	0.19	418.5	$66.96	10.52
		Totals	692				105.51	310532	$49,685.13	625			44.62	135512	$21,681.93		$18,105.15	53.73	158919	$25,427.04	8.54

STATEMENT OF ENERGY PERFORMANCE
Manchester Twp. Municipal Office/Court and Police Station

Building ID: 1677442
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 08, 2009

Facility
Manchester Twp. Municipal Office/Court and Police Station
1 Colonial Dr.
Manchester, NJ 08759

Facility Owner
Manchester Township - Division of Utilities
1 Colonial Dr.
Manchester, NJ 08759

Primary Contact for this Facility
Joseph Veni
1 Colonial Dr.
Manchester, NJ 08759

Year Built: 1988
Gross Floor Area (ft²): 45,711

Energy Performance Rating[2] (1-100) 51

Site Energy Use Summary[3]

Electricity (kBtu)	2,802,753
Natural Gas (kBtu)[4]	1,872,900
Total Energy (kBtu)	4,675,653

Energy Intensity[5]

Site (kBtu/ft²/yr)	102
Source (kBtu/ft²/yr)	248

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	526

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	251
% Difference from National Average Source EUI	-1%
Building Type	Office

Stamp of Certifying Professional

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Raymond Johnson
520 South Burnt Mill Rd.
Voorhees , NJ 08043

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Manchester Twp. Municipal Office/Court and Police Station	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	1 Colonial Dr., Manchester, NJ 08759	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Office/Court (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	24,640 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	45 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	75	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	45	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Police Station (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑

Gross Floor Area	21,071 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		
Weekly operating hours	168 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		
Workers on Main Shift	60	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		
Number of PCs	58	Is this the number of personal computers in the Office?		
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Jersey Central Power & Lt Co

Fuel Type: Electricity		
Meter: Office/Court Electric Meter (kWh) **Space(s):** Office/Court		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	23,520.00
11/01/2008	11/30/2008	25,680.00
10/01/2008	10/31/2008	24,840.00
09/01/2008	09/30/2008	28,920.00
08/01/2008	08/31/2008	30,000.00
07/01/2008	07/31/2008	32,520.00
06/01/2008	06/30/2008	22,320.00
05/01/2008	05/31/2008	27,600.00
04/01/2008	04/30/2008	24,480.00
03/01/2008	03/31/2008	24,360.00
02/01/2008	02/29/2008	25,800.00
01/01/2008	01/31/2008	24,360.00
Office/Court Electric Meter Consumption (kWh)		**314,400.00**
Office/Court Electric Meter Consumption (kBtu)		**1,072,732.80**
Meter: Police Station Electric Meter (kWh) **Space(s):** Police Station		
Start Date	**End Date**	**Energy Use (kWh)**
12/01/2008	12/31/2008	36,000.00
11/01/2008	11/30/2008	42,880.00
10/01/2008	10/31/2008	46,800.00
09/01/2008	09/30/2008	50,720.00
08/01/2008	08/31/2008	55,680.00
07/01/2008	07/31/2008	60,480.00
06/01/2008	06/30/2008	39,520.00
05/01/2008	05/31/2008	36,800.00
04/01/2008	04/30/2008	34,080.00
03/01/2008	03/31/2008	28,560.00
02/01/2008	02/29/2008	38,720.00
01/01/2008	01/31/2008	36,800.00
Police Station Electric Meter Consumption (kWh)		**507,040.00**
Police Station Electric Meter Consumption (kBtu)		**1,730,020.48**

Total Electricity Consumption (kBtu)	**2,802,753.28**
Is this the total Electricity consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas		
Meter: Natural Gas (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/01/2008	12/31/2008	2,997.00
11/01/2008	11/30/2008	1,859.00
10/01/2008	10/31/2008	720.00
09/01/2008	09/30/2008	511.00
08/01/2008	08/31/2008	415.00
07/01/2008	07/31/2008	271.00
06/01/2008	06/30/2008	632.00
05/01/2008	05/31/2008	931.00
04/01/2008	04/30/2008	1,611.00
03/01/2008	03/31/2008	2,146.00
02/01/2008	02/29/2008	3,079.00
01/01/2008	01/31/2008	3,557.00
Natural Gas Consumption (therms)		**18,729.00**
Natural Gas Consumption (kBtu)		**1,872,900.00**
Total Natural Gas Consumption (kBtu)		**1,872,900.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

Certifying Professional

(When applying for the ENERGY STAR, this must be the same PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Manchester Twp. Municipal Office/Court and Police Station
1 Colonial Dr.
Manchester, NJ 08759

Facility Owner
Manchester Township - Division of Utilities
1 Colonial Dr.
Manchester, NJ 08759

Primary Contact for this Facility
Joseph Veni
1 Colonial Dr.
Manchester, NJ 08759

General Information

Manchester Twp. Municipal Office/Court and Police Station	
Gross Floor Area Excluding Parking: (ft^2)	45,711
Year Built	1988
For 12-month Evaluation Period Ending Date:	December 31, 2008

Facility Space Use Summary

Office/Court		Police Station	
Space Type	Office	Space Type	Office
Gross Floor Area(ft^2)	24,640	Gross Floor Area(ft^2)	21,071
Weekly operating hours	45	Weekly operating hours	168
Workers on Main Shift	75	Workers on Main Shift	60
Number of PCs	45	Number of PCs	58
Percent Cooled	50% or more	Percent Cooled	50% or more
Percent Heated	50% or more	Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2008)	**Baseline** (Ending Date 12/31/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	51	51	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	102	102	77	N/A	104
Source (kBtu/ft^2)	248	248	186	N/A	251
Energy Cost					
$/year	$ 168,702.00	$ 168,702.00	$ 126,580.10	N/A	$ 171,159.39
$/$ft^2$/year	$ 3.69	$ 3.69	$ 2.77	N/A	$ 3.74
Greenhouse Gas Emissions					
$MtCO_2e$/year	526	526	395	N/A	534
$kgCO_2e/ft^2$/year	12	12	9	N/A	12

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

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

Manchester Municipal/Court and Police Station PV Financials
Self Financed 70%-20 Year Term-7.0% Interest Rate

Total Project Cost	$625,600	System Size (kW)	78.20	Tax Rate	0.0%
		Utility Rate ($/kWh)	$0.1600		
Net Project Cost	$625,600	Utility Rate Inflation	3.00%		
Percent Financed	**70%**	REC Value ($/kWh)	$0.350		
Capital Outlay	$187,680	Term (years)	**20**		
Financing Principal	$437,920	Rate	**7.0%**		

Year	0	1	2	3	4	5	6	7	8	9	10	11	12
Solar Generation (kWh)		108,990	108,445	107,903	107,363	106,826	106,292	105,761	105,232	104,706	104,182	103,661	103,143
Utility Rate per kWh		$0.160	$0.165	$0.170	$0.175	$0.180	$0.185	$0.191	$0.197	$0.203	$0.209	$0.215	$0.221
Federal Tax Credit		$0											
Cash effect of depreciation		$0	$0	$0	$0	$0	$0						
Avoided Utility Pmnt (from Solar Generation)		$17,438	$17,872	$18,316	$18,771	$19,237	$19,716	$20,205	$20,708	$21,222	$21,750	$22,290	$22,844
Revenue from REC Sale		$38,147	$37,956	$37,766	$37,577	$37,389	$37,202	$37,016	$36,831	$36,647	$36,464	$36,282	$36,100
Subtotal		$55,585	$55,828	$56,082	$56,348	$56,627	$56,918	$57,222	$57,539	$57,869	$58,213	$58,572	$58,944
Finance payment		($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)
Interest expense		($30,654)	($29,907)	($29,107)	($28,250)	($27,334)	($26,354)	($25,306)	($24,183)	($22,983)	($21,698)	($20,323)	($18,852)
Operations & Maintenance		$0	$0	$0	$0	$797	$829	$862	$897	$933	$970	$1,009	
Subtotal		($30,654)	($29,907)	($29,107)	($28,250)	($27,334)	($25,557)	($24,476)	($23,321)	($22,086)	($20,765)	($19,353)	($17,844)
Net Savings		$24,931	$25,921	$26,975	$28,098	$29,292	$31,361	$32,745	$34,218	$35,783	$37,448	$39,218	$41,100
Taxes on net savings (no tax on principle payment)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net savings after taxes		$24,931	$25,921	$26,975	$28,098	$29,292	$31,361	$32,745	$34,218	$35,783	$37,448	$39,218	$41,100
Principal Payment		($10,682)	($11,430)	($12,230)	($13,086)	($14,002)	($14,982)	($16,031)	($17,153)	($18,354)	($19,639)	($21,013)	($22,484)
Net Cash Flow After Taxes	($187,680)	$14,248	$14,491	$14,745	$15,012	$15,290	$16,378	$16,714	$17,064	$17,429	$17,809	$18,205	$18,616
Cumulative savings before taxes		$24,931	$50,851	$77,827	$105,924	$135,217	$166,577	$199,323	$233,540	$269,324	$306,772	$345,990	$387,091

Year	13	14	15	16	17	18	19	20	21	22	23	24	25
Solar Generation (kWh)	102,627	102,114	101,604	101,096	100,590	100,087	99,587	99,089	98,593	98,101	97,610	97,122	96,636
Utility Rate per kWh	$0.228	$0.235	$0.242	$0.249	$0.257	$0.264	$0.272	$0.281	$0.289	$0.298	$0.307	$0.316	$0.325
Federal Tax Credit													
Subtotal													
Avoided Utility Pmnt (from Solar Generation)	$23,412	$23,993	$24,590	$25,201	$25,827	$26,469	$27,126	$27,800	$28,491	$29,199	$29,925	$30,669	$31,431
Revenue from REC sale	$35,920	$35,740	$35,561	$35,384	$35,207	$35,031	$34,855	$34,681	$34,508	$34,335	$34,164	$33,993	$33,823
Subtotal	$59,331	$59,733	$60,151	$60,584	$61,033	$61,499	$61,982	$62,482	$62,999	$63,535	$64,088	$64,661	$65,253
Finance payment	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	($41,337)	$0	$0	$0	$0	$0
Interest expense	($17,278)	($15,594)	($13,792)	($11,864)	($9,801)	($7,594)	($5,232)	($2,704)	$0	$0	$0	$0	$0
Operations & Maintenance	$1,049	$1,091	$1,135	$1,180	$1,227	$1,276	$1,327	$1,380	$1,436	$1,493	$1,553	$1,615	$1,680
Subtotal	($16,229)	($14,503)	($12,658)	($10,684)	($8,574)	($6,317)	($3,904)	($1,324)	$1,436	$1,493	$1,553	$1,615	$1,680
Net Savings	$43,102	$45,230	$47,493	$49,900	$52,460	$55,182	$58,078	$61,158	$64,435	$65,028	$65,641	$66,276	$66,933
Taxes on net savings (no tax on principle payment)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net savings after taxes	$43,102	$45,230	$47,493	$49,900	$52,460	$55,182	$58,078	$61,158	$64,435	$65,028	$65,641	$66,276	$66,933
Principal Payment	($24,058)	($25,742)	($27,544)	($29,472)	($31,535)	($33,743)	($36,105)	($38,632)	$0	$0	$0	$0	$0
Net Cash Flow After Taxes	$19,044	$19,488	$19,949	$20,428	$20,924	$21,439	$21,973	$22,526	$64,435	$65,028	$65,641	$66,276	$66,933
Cumulative savings before taxes	$430,193	$475,423	$522,916	$572,816	$625,276	$680,457	$738,535	$799,693	$864,128	$929,155	$994,797	$1,061,073	$1,128,006
Total Payment	#REF!	#REF!	#REF!										

Internal Rate of Return After Taxes	10%
NPV of After Tax Cash Flows	$32,911
NPV Discount Rate	8.00%

These Figures are estimates for discussion only.

Manchester Municipal/Court and Police Station PV Financials
Purchase

Total Project Cost	$625,600	System Size (kW)	78.20	Tax Rate	0.0%
		Utility Rate ($/kWh)	$0.1600		
Net Project Cost	$625,600	Utility Rate Inflation	3.00%		
		REC Value ($/kWh) year 1-25	$0.350		
Capital Outlay	$625,600				

Year	0	1	2	3	4	5	6	7	8	9	10	11	12
Solar Generation (kWh)		108,990	108,445	107,903	107,363	106,826	106,292	105,761	105,232	104,706	104,182	103,661	103,143
Utility Rate per kWh		$0.160	$0.165	$0.170	$0.175	$0.180	$0.185	$0.191	$0.197	$0.203	$0.209	$0.215	$0.221
Capital Outlay	($625,600)												
Tax Credit		$0											
Cash effect of depreciation		$0	$0	$0	$0	$0	$0						
Avoided Utility Pmnt (from Solar Generation)		$17,438	$17,872	$18,316	$18,771	$19,237	$19,716	$20,205	$20,708	$21,222	$21,750	$22,290	$22,844
Revenue from REC Sale		$38,147	$37,956	$37,766	$37,577	$37,389	$37,202	$37,016	$36,831	$36,647	$36,464	$36,282	$36,100
Subtotal		$55,585	$55,828	$56,082	$56,348	$56,627	$56,918	$57,222	$57,539	$57,869	$58,213	$58,572	$58,944
Operations & Maintenance		$0	$0	$0	$0	$0	$797	$829	$862	$897	$933	$970	$1,009
Subtotal		$0	$0	$0	$0	$0	$797	$829	$862	$897	$933	$970	$1,009
Net Savings		$55,585	$55,828	$56,082	$56,348	$56,627	$57,715	$58,051	$58,401	$58,766	$59,146	$59,541	$59,953
Taxes on net savings		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net Savings after taxes	($625,600)	$55,585	$55,828	$56,082	$56,348	$56,627	$57,715	$58,051	$58,401	$58,766	$59,146	$59,541	$59,953
Cumulative Savings	($625,600)	($570,015)	($514,188)	($458,106)	($401,758)	($345,131)	($287,416)	($229,365)	($170,964)	($112,198)	($53,052)	$6,489	$66,442

Year	13	14	15	16	17	18	19	20	21	22	23	24	25
Solar Generation (kWh)	102,627	102,114	101,604	101,096	100,590	100,087	99,587	99,089	98,593	98,101	97,610	97,122	96,636
Utility Rate per kWh	$0.228	$0.235	$0.242	$0.249	$0.257	$0.264	$0.272	$0.281	$0.289	$0.298	$0.307	$0.316	$0.325
Avoided Utility Pmnt (from Solar Generation)	$23,412	$23,993	$24,590	$25,201	$25,827	$26,469	$27,126	$27,800	$28,491	$29,199	$29,925	$30,669	$31,431
Revenue from REC sale	$35,920	$35,740	$35,561	$35,384	$35,207	$35,031	$34,855	$34,681	$34,508	$34,335	$34,164	$33,993	$33,823
Subtotal	$59,331	$59,733	$60,151	$60,584	$61,033	$61,499	$61,982	$62,482	$62,999	$63,535	$64,088	$64,661	$65,253
Operations & Maintenance	$1,049	$1,091	$1,135	$1,180	$1,227	$1,276	$1,327	$1,380	$1,436	$1,493	$1,553	$1,615	$1,680
Subtotal	$1,049	$1,091	$1,135	$1,180	$1,227	$1,276	$1,327	$1,380	$1,436	$1,493	$1,553	$1,615	$1,680
Net Savings	$60,380	$60,824	$61,286	$61,764	$62,261	$62,776	$63,309	$63,862	$64,435	$65,028	$65,641	$66,276	$66,933
Taxes on net savings	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net savings after taxes	$60,380	$60,824	$61,286	$61,764	$62,261	$62,776	$63,309	$63,862	$64,435	$65,028	$65,641	$66,276	$66,933
Cumulative Savings	$126,822	$187,647	$248,932	$310,696	$372,957	$435,733	$499,042	$562,904	$627,339	$692,366	$758,008	$824,284	$891,217

After Tax IRR	8.1%
NPV of Net Savings After Taxes	$3,215
NPV Discount Rate	8.00%

Manchester Municipal/Court and Police Station PV Financials
Depreciation Calculations

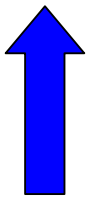
Project Cost	$625,600
Net Project Cost	$625,600
Federal Tax Credit	$0
Federal Depreciation Basis	$0
Federal Tax Rate	0%

Year	0	1	2	3	4	5	6	7	8	9	10	11	12
Depreciation percentage - Federal		20.00%	32.00%	19.20%	11.52%	11.52%	5.76%						
MACRS Depreciation Amount - Federal		$0	$0	$0	$0	$0	$0						
Federal Tax Credit		$0											
Cash effect of Federal depreciation		$0	$0	$0	$0	$0	$0						
Total Annual tax savings on depreciation		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

These figures are estimates for discussion only. Actual results and depreciation methods may vary.

GDS MACRS, 200%
5 years recovery, half year convention
property placed in service first quarter

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Municipal Office/Court/Police	5060	Sunpower SPR230	340	14.7	4,999	78.20	108,990	11,220	15.64



NORTH

Water Conservation Savings Calculations

Concord Engineering Group

Manchester Township Faucets
Install 0.5 GPM Neoperl Faucet Aerators from existing Faucets
Assume occupants have 10 minutes/day sink usage at 50 degrees F rise

Number of Occupents: 200

Q=GAL * 60%(MIX) * 8.34 lb/gal * dT
$17.80 per MMbtu Diesel
$3.80 per kGal

LOCATION	EXIST. GPM	PROP. GPM	MIN/DAY	DAYS/YR	OCC RATE	# FAUCETS	EXIST.GPY	PROP. GPY	EXIST W/S COST	Water Heating MMbtu Annual	Water Heating Cost	PROP. W/S COST	PROP. Water Heating MMbtu Annual	Water Heating Cost	TOT SAV	TOT SAV (GPY)
Police Station	2.5	0.5	7.5	365	20.00%	21	28,744	5,749	$109	8.63	$154	$22	1.73	$31	$210	22,995
Municipal Office/Court	2.5	0.5	7.5	250	30.00%	15	21,094	4,219	$80	6.33	$113	$16	1.27	$23	$154	16,875
Total							49,838	9,968	$189	14.96	$267	$38	2.99	$54	**$364**	39870

Manchester Township Showers
Install 2.0 GPM Oxygenics Fivestar 400 Model Low Flow Shower Heads from existing 2.5 GPM Showerheads
Assume 2 occupants have 10 minute shower usage per day at 50 degrees F rise

$17.80 per MMbtu Diesel
$3.80 per kGal

LOCATION	EXIST. GPM	PROP. GPM	MIN/DAY	DAYS/YR	OCC RATE	# SHOWERS	EXIST.GPY	PROP. GPY	EXIST W/S COST	Water Heating MMbtu Annual	Water Heating Cost	PROP. W/S COST	PROP. Water Heating MMbtu Annual	Water Heating Cost	TOT SAV	TOT SAV (GPY)
Police Station	3	2	10	365	20.00%	5	10,950	7,300	$42	3.29	$59	$28	2.19	$39	$34	3,650
Total							10,950	7,300	$42	3.29	$59	$28	2.19	$39	**$34**	3650

Manchester Township Water Closets

Replace existing EPACT 1992 1.6 GPF Toilets with Pressure Assisted Kohler Model K-3393 Dual Flush Mode Toilet 0.9 GPF or 1.4 GPF

Assumes 2 Guests per room with 2.5 uses per day per guest, and that one of the flushes is 1 GPF and 3 are 1.4 GPF

$3.80 per kGal

LOCATION	EXIST. GPF	PROP. GPF	# TOILETS	OCCUP. RATE	USES PER DAY PER GUEST	DAYS/YR	Gallons per Year (Existing)	Annual Cost of Water (Existing)	Gallons per Year (Proposed)	Annual Cost of Water (Proposed)	TOT SAV	TOT SAV (GPY)
Police Station	1.8	1.3	16	33.00%	2	365	6,938	$26	5,011	$19	$7	1,927
Municipal Office/Court	1.8	1.3	14	66.00%	3	250	12,474	$47	9,009	$34	$13	3,465
Total							19,412	73	$14,020	53	**$20**	5392.2

Manchester Township Urinals

Replace existing EPACT 1992 1 GPF Urinal with a 0.5 GPF American Standard Flowise Urinal Flush Valve Model 6063505.002

$3.80 per kGal

LOCATION	# of Urinals	Existing GPF	Proposed GPF	OCCUP. RATE	USES PER DAY PER PERSON	Days per Year	Gallons per Year (Existing)	Annual Cost of Water (Existing)	Gallons per Year (Proposed)	Annual Cost of Water (Proposed)	TOT SAV	TOT SAV (GPY)
Police Station	5	1	0.5	33.00%	5	365	3,011	$11	1,506	$6	$5.00	$1,505.63
Municipal Office/Court	4	1	0.5	66.00%	5	250	3,300	$13	1,650	$6	$7.00	$1,650.00
Total							6311.25	$24.00	3155.625	$12.00	**$12.00**	3155.625

Water Fixture Retrofit	Annual Water Use Savings, Gallons	Annual Water Savings, $	Annual Water Heating Reduction, MMbtu	Annual Water Heating Savings, $	Material Cost	Labor Cost	Total Cost	Simple Payback, years
Faucets	39,870	$364	11.97	$213	$110	$1,350	$1,460	2.53
Showerheads	3,650	$34	1.10	$25	$305	$188	$493	8.35
Water Closets	5,392	$20	0.00	$0	$18,103	$5,547	$23,650	1,182.50
Urinals	3,156	$12	0.00	$0	$4,005	$1,148	$5,153	429.38
TOTAL	52,068	$430	13	$238	$22,523	$8,232	$30,755	46.04

FINANCIAL SUMMARY

CONCORD ENERGY GROUP

ECM	Description	Total Utility Cost	Utility Cost Savings	Annual Maintenance Savings	Total Annual Savings	Total Project Cost, $	Utility Rebate, $	Net Project Cost, $	Simple Payback, Years	NPV 10 Year, $	Lifecycle Payback	Internal Rate of Return	Recommended Options
Utility conservation upgrades													
	BASE CASE - EXISTING EQUIPMENT	$170,667											
1	LIGHTING UPGRADE		$26,676	$0	$26,676	$18,105	($9,300)	$27,405	1.03	$307,660	1.00	35.9%	
2	LIGHTING CONTROLS		$929	$0	$929	$3,600	($960)	$4,560	4.91	$8,382	4.00	12.8%	
3	BUILDING ENVELOPE IMPROVEMENT		$1,879	$0	$1,879	$112,500	$0	$112,500	59.87	($89,428)	N/A	-3.0%	
4	REPLACE HHW BOILERS		$4,907	$1,360	$6,267	$64,000	($2,121)	$66,121	10.55	$61,815	5.00	13.0%	
5	REPLACE DHW BOILERS		$606	$0	$606	$9,511	($500)	$10,011	16.52	$18,585	6.00	11.0%	
6	REPLACE CONDENSING UNITS		$2,914	$0	$2,914	$32,070	($2,190)	$34,260	11.76	$24,187	2.00	11.5%	
7	PROGRAMMABLE THERMOSTATS		$541	$0	$541	$1,600	$0	$1,600	2.96	$7,767	3.00	14.7%	
8	PREMIUM EFFICIENCY MOTORS		$820	$0	$820	$4,475	($160)	$4,635	5.65	$30,627	6.00	N/A	

ENERGY CHANGE MEASURES - SUMMARY SHEET

CONCORD ENERGY GROUP

ECM	Description	Electric, KW	KW Savings	Electric, KWH	KWH Savings	Electric Cost	Electric Cost Savings, $	Natural Gas, therms	Natural Gas Savings, therms	Natural Gas Cost	Natural Gas Cost Savings, $	Water & Sewer, Gallons/1000	Water Savings, Gallons/1000	Water & Sewer Cost	Water & Sewer Savings $	Total Utility Cost	Utility Cost Savings *	Maintenance Cost	Annual Maintenance Savings	Total Annual Savings	Total Project Cost, $	Utility Rebate, $	Net Project Cost, $	Simple Payback, Years	NPV 20 Year, $	Lifecycle Payback Years	Internal Rate of Return
Utility conservation upgrades																											
	BASE CASE - EXISTING EQUIPMENT	280		831,440		$139,565		18,274		$31,102						$170,667	$0	$15,084									
1	LIGHTING UPGRADE	226	54	672,521	158,919	$112,889	$26,676	18,274	0	$31,102	$0		0		$0	$143,991	$26,676	$15,084	$0	$26,676	$18,105	($9,300)	$8,805	0.33	$307,660	1.00	35.9%
2	LIGHTING CONTROLS		280	825,905	5,535	$138,636	$929	18,274	0	$31,102	$0		0		$0	$169,738	$929	$15,084	$0	$929	$3,600	($960)	$2,640	2.84	$8,382	4.00	12.8%
3	BUILDING ENVELOPE IMPROVEMENT		280	831,440	0	$139,565	$0	17,170	1,104	$29,223	$1,879		0		$0	$168,788	$1,879	$15,084	$0	$1,879	$112,500	$0	$112,500	59.87	($89,428)	N/A	-3.0%
4	REPLACE HHW BOILERS		280	831,440	0	$139,565	$0	15,391	2,883	$26,195	$4,907		0		$0	$165,760	$4,907	$13,724	$1,360	$6,267	$64,000	($2,121)	$61,879	9.87	$61,815	5.00	13.0%
5	REPLACE DHW BOILERS		280	831,440	0	$139,565	$0	17,918	356	$30,496	$606		0		$0	$170,061	$606	$15,084	$0	$606	$9,511	($500)	$9,011	14.87	$18,585	6.00	11.0%
6	REPLACE CONDENSING UNITS		280	814,083	17,357	$136,651	$2,914	18,274	0	$31,102	$0		0		$0	$167,753	$2,914	$15,084	$0	$2,914	$32,070	($2,190)	$29,880	10.26	$24,187	2.00	11.5%
7	PROGRAMMABLE THERMOSTATS		280	828,216	3,224	$139,024	$541	18,274	0	$31,102	$0		0		$0	$170,126	$541	$15,084	$0	$541	$1,600	$0	$1,600	2.96	$7,767	3.00	14.7%
8	PREMIUM EFFICIENCY MOTORS		280	826,552	4,888	$138,745	$820	18,274	0	$31,102	$0		0		$0	$169,847	$820	$15,084	$0	$820	$4,475	($160)	$4,315	5.26	$30,627	6.00	N/A

CONSTRUCTION COST AND REBATES

CONCORD ENERGY GROUP

MUNICIPAL OFFICE/COURT AND POLICE STATION

BASE CASE - EXISTING EQUIPMENT

	Qty	Unit Cost $	Material $	Labor $	Total $
Annual Energy Cost					$170,667

ECM 1 LIGHTING UPGRADE

	Qty	Unit Cost $	Material $	Labor $	Total $
Lighting Retrofit	LS	$18,105	$0	$0	$18,105
Total Cost			$0	$0	$18,105
Utility Incentive					($9,300)
Total Cost Less Rebate					$8,805

ECM 2 LIGHTING CONTROLS

	Qty	Unit Cost $	Material $	Labor $	Total $
Dual - Technology Sensor	48	$75	$3,600	$0	$3,600
Total Cost			$3,600	$0	$3,600
Utility Incentive - NJ Smart Start					($960)
Total Cost Less Rebate					$2,640

ECM 3 BUILDING ENVELOPE IMPROVEMENTS

	Qty	Unit Cost $	Material $	Labor $	Total $
Energy Efficient Windows	LS	$74,700	$0	$0	$74,700
Attic Insulation	LS	$37,800	$0	$0	$37,800
Total Cost			$0	$0	$112,500
Utility Incentive - N/A					$0
Total Cost Less Rebate					$112,500

ECM 4 REPLACE HHW BOILERS

	Qty	Unit Cost $	Material $	Labor $	Total $
Demolish Exist HW Boilers; Typ. 8	8	$2,250	$0	$18,000	$18,000
New AERCO HW Boiler M/N MLX606H	2	$21,750	$29,000	$14,500	$43,500
Modify Exist Flue	1	$1,500	$800	$700	$1,500
Modify Exist Piping	LS	$1,000	$0	$0	$1,000
Total Cost			$29,800	$33,200	$64,000
Utility Incentive - NJ Smart Start					($2,121)
Total Cost Less Rebate					$61,879

ECM 5 REPLACE DHW BOILERS

	Qty	Unit Cost $	Material $	Labor $	Total $
Demolish Exist HW Heater; Typ. 1	1	$61	$0	$61	$61
New AO Smith Cyclone M/N BTH-250	1	$8,890	$8,520	$370	$8,890
Vent Kit and Piping	1	$560	$375	$185	$560
Total Cost			$8,895	$616	$9,511
Utility Incentive - NJ Smart Start					($500)
Total Cost Less Rebate					$9,011

ECM 6 REPLACE CONDENSING UNITS AND EVAPORATOR COILS

	Qty	Unit Cost $	Material $	Labor $	Total $
Demolish Exist Evap Coil; Typ. 3	3	$885	$0	$2,655	$2,655
Demolish Exist Refrig Piping; Typ. 3	3	$200	$0	$600	$600
New Evap Coil, Condensing Unit; Trane M/N TTA 230B3	3	$7,875	$16,800	$6,825	$23,625
New Refrigerant Line Sets (Est. 150 Ft)	3	$1,330	$2,090	$1,900	$3,990
Condensing Unit Pads	3	$400	$900	$300	$1,200
Total Cost			$19,790	$12,280	$32,070
Utility Incentive - NJ Smart Start					($2,190)
Total Cost Less Rebate					$29,880

ECM 7 PROGRAMMABLE THERMOSTATS

	Qty	Unit Cost $	Material $	Labor $	Total $
Programable T-stat	8	$120	$960	$640	$1,600
Total Cost			$960	$640	$1,600
Utility Incentive - N/A					$0
Total Cost Less Rebate					$1,600

ECM 8 PREMIUM EFFICIENCY MOTORS

	Qty	Unit Cost $	Material $	Labor $	Total $
1 HP Motor	4	$395	$1,580	$0	$1,580
1.5 HP Motor	3	$495	$1,485	$0	$1,485
2 HP Motor	2	$705	$1,410	$0	$1,410
Total Cost			$4,475	$0	$4,475
Utility Incentive					($160)
Total Cost Less Rebate					$4,315

EQUIPMENT REPLACEMENT COST

CONCORD ENERGY GROUP

MUNICIPAL OFFICE/COURT AND POLICE STATION

BASE CASE - EXISTING EQUIPMENT

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

ECM 1 LIGHTING UPGRADE

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

ECM 2 LIGHTING CONTROLS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

ECM 3 BUILDING ENVELOPE IMPROVEMENTS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

ECM 4 REPLACE HHW BOILERS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$0	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2
New AERCO HW Boilers; Typ. 2	$43,500	24	24	

ECM 5 REPLACE DHW BOILERS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$0	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2
New AO Smith Cyclone DHW Heater; Typ. 1	$8,890	24	24	

ECM 6 REPLACE CONDENSING UNITS AND EVAPORATOR COILS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$0	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$0	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2
New Evap Coil and Condensing Units; Typ. 3	$23,625	15	15	

ECM 7 PROGRAMMABLE THERMOSTATS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

ECM 8 PREMIUM EFFICIENCY MOTORS

	$	Life	Yr Incurred	Remarks
Exist. Hydrotherm Boilers (234 MBH Output); Typ. 8	$48,800	25	4	
Exist. Police Mech Room Pumps; Typ. 3	$7,425	10	1	Note 2
Exist. Municipal Mech Room Pump; Typ. 6	$18,550	10	1	Note 2
Exist. Rheem Hot Water Heater; Typ. 1	$2,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Condensing Units; Typ. 3	$30,225	15	1	Note 2
Exist. Carrier Weathermaker AHU Evaporator Coils; Typ. 3	$5,400	20	1	Note 2
Exist. Amana PTAC Units; Typ. 65	$87,750	15	1	Note 2

Notes:

1. Only equipment involved in the above-noted ECMs has been included in recurring / replacement costs. However, there are instances where existing equipment located throughout the facility is either at or exceeding their estimated service life as noted in ASHRAE HVAC Applications.
2. Existing HVAC equipment is well past ASHRAE recommended service life hence, replacement at Year 1.

ANNUAL MAINTENANCE COST

CONCORD ENERGY GROUP

MUNICIPAL OFFICE/ COURT AND POLICE STATION

ECM	Description	Base	Additional	Total
	BASE CASE EXISTING CONDITIONS	$15,084	$0	$15,084
1	LIGHTING UPGRADE	$15,084	$0	$15,084
2	LIGHTING CONTROLS	$15,084	$0	$15,084
3	BUILDING ENVELOPE IMPROVEMENT	$15,084	$0	$15,084
4	REPLACE HHW BOILERS	$15,084	($1,360)	$13,724
5	REPLACE DHW BOILERS	$15,084	$0	$15,084
6	REPLACE CONDENSING UNITS	$15,084	$0	$15,084
7	PROGRAMMABLE THERMOSTATS	$15,084	$0	$15,084
8	PREMIUM EFFICIENCY MOTORS	$15,084	$0	$15,084

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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 January, 2009:

Electric Chillers

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

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

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

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

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

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 - $30 per fixture, (depending on quantity)
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

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

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