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Local Government Energy Program
Energy Audit Final Report

For

Mount Olive Municipal Building
Budd Lake, NJ 07828

Project Number: LGEA27

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INTRODUCTION

On September 22nd and October 19th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Mount Olive Municipal buildings. The audit included a review of the:

- Mount Olive Township Municipal Building
- Mount Olive Township Public Library
- Mount Olive Township Senior Citizen Center
- Mount Olive Township Garage

The buildings are located in Budd Lake, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Mount Olive Municipal Building located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The single-story Mt. Olive Municipal building was built in 1998, without any major renovations or additions since then. The building is composed of three major sections. The left side houses the Court, the Health Department, the Senior and Social Services. The right side houses the Building, the Planning and Zoning, the Fire Marshall, the Public Works, the Recreation and the Finance Departments and a conference room. The center section houses the Police, the Administration Departments, a conference room, the Cafeteria and the Council Room. The building consists of 35,000 square feet of conditioned space. The Mt. Olive Municipal building is occupied on weekdays by approximately 105 employees and staff from 8:30 AM - 4:30 PM. Evening meetings and the Court keep part of the building open Mondays till 7:30 PM and 3-5 nights / week to 10:00 PM. The Police Department operates 24 hrs / 7 days with 26-30 employees during the daytime and 8 at night.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to the Township of Mount Olive to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Mt. Olive Municipal building. SWA was informed that the Township of Mount Olive has been certified under the Sustainable Jersey program as one of 34 communities state wide to achieve the status.

Launched in 2008, the LGEA Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize 75% of the cost of the audit. If the net cost of the installed measures recommended by the audit, after applying eligible NJ SmartStart Buildings incentives, exceeds the remaining cost of the audit, then that additional 25% will also be paid by the program. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Mt. Olive Municipal building located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The Mt. Olive Municipal building is a single-story building with a floor area of 35,000 square feet. The original structure was built in 1998, without any major renovations or additions since then.

Based on the field visits performed by the SWA staff on September 22nd and October 19th and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

From September 2008 and August 2009 the Mt. Olive Municipal building consumed 674,080 kWh or $110,373 worth of electricity at an approximate rate of $0.164/kWh and 20,530 therms or $30,907 worth of natural gas at an approximate rate of $1.505/therm. The joint energy consumption for the building, including both electricity and natural gas, was 4,353 MMBtu of energy that cost a total of $141,280.

SWA has entered energy information about the Mt. Olive Municipal / Police Department building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This mixed use facility (township offices / police station / courthouse) is comprised of non-eligible (Other) space type. SWA encourages the Township of Mount Olive to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. EPA is continually working to expand the available space types.

The Site Energy Use Intensity is 124 kBtu/ft^{2}yr compared to the national average of township offices / police station building consuming 78 kBtu/ft^{2}yr. Implementing this report's recommendations and discounting server room cooling will reduce use by approximately 47.6 kBtu/ft^{2}yr, which when implemented would make the building energy consumption better than the national average. There may be energy procurement opportunities for the Mt. Olive Municipal building to reduce annual utility costs, which are $8,347 higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Mt. Olive Municipal building, SWA has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- Upgrade Building Management System (BMS)
- Select NEMA Premium motors when replacing motors at the end of their useful operating lives
- Install revolving doors - to relieve pressure from building at entrance doors

Category II Recommendations: Operations and Maintenance

- Air balance distributed conditioned air - for uniform and steady temperature control
- Evaluate the building base
- Thoroughly and evenly insulate space (with batt insulation) above the ceiling tiles
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly
- Maintain downspouts - Repair / install missing downspouts as needed
- Provide weather stripping / air sealing
- Repair / seal wall cracks and penetrations

- Provide water efficient fixtures and controls
- Use Energy Star labeled appliances
- Check electrical feeds to the building for grounding - to ensure that the 3 electrical phase are balanced
- Use smart power electric strips
- Create an energy educational program

Category III Recommendations: Energy Conservation Measures - Upgrades with associated energy savings

At this time, SWA highly recommends a total of **5** Energy Conservation Measures (ECMs) for the Mt. Olive Municipal building that are summarized in the following Table 1. The total investment cost for these ECMs with incentives is **$15,050**. SWA estimates a first year savings of **$4,412** with a simple payback of **3.4 years**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Mt. Olive Municipal building by **36,421 lbs of CO_2**, which is equivalent to removing approximately 3 cars from the roads each year or avoiding the need of 89 trees to absorb the annual CO_2 generated. SWA also recommends **3** ECMs with a total first year savings of **$47,114** that is summarized in Table 2.

There are various incentives that the Township of Mount Olive could apply for that could also help lower the cost of installing the ECMs, such as enroll in the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive program can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, to be rolled out soon, could also assist to cover 80% of the capital investment.

Renewable ECMs require application approval and negotiations with the utility and proof of performance. There is also a utility-sponsored loan program through JCP&L that would allow the building to pay for the installation of the PV system through a loan issued by JCP&L.

The following two tables summarize the proposed Energy Conservation Measures (ECM) and their economic relevance.

Table 1 - Highly Recommended 0-5 Year Payback ECMs																			
ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
1	install 1 Drinks and 1 Snacks vending machine energy misers - in cafeteria / break room	www.usatech.com and established costs	458	none at this time	458	1,999	0.4	0	0.2	0	328	12	3,934	1.4	759	63	71	2,805	2,739
2.1	install (7) daylight sensors on hallways and lobby	RS Means, Lit Search, NJ Clean Energy Program	1,540	175	1,365	3,377	0.7	0	0.2	18	571	12	6,646	2.4	402	34	41	4,322	4,626
3	install 7.5 kW Wind rooftop system (with $3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	1.5	0	2,604	25	65,098	3.5	1035	41	28	36,150	21,752
2.2	install (17) occupancy sensors	RS Means, Lit Search, NJ Clean Energy Program	3,740	425	3,315	4,525	0.9	0	0.3	18	760	12	8,905	4.4	175	15	20	4,246	6,199
2.3	replace (4) T12 with T8 fixtures	RS Means, Lit Search, NJ Clean Energy Program	840	120	720	806	0.2	0	0.1	18	150	15	1,983	4.8	212	14	19	1,067	1,104
	TOTALS		**66,578**	**51,528**	**15,050**	**26,585**	**9.7**	**0**	**2.4**	**53**	**4,412**	**-**	**86,566**	**3.4**	**-**	**-**	**-**	**48,591**	**36,421**

Assumptions: Discount Rate: 3% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines
Note: A 0.0 electrical demand reduction / month indicates that it is very low / negligible

Table 2 - Recommended 5-10 Year Payback ECMs																		
ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
4	retro commission-ing	similar projects	43,750	none at this time	43,750	10,960	2.3	2,053	6.9	1,820	6,707	12	58,646	6.5	84	7	11	23,014	39,035
5	install 45 kW PV rooftop system (with $1/W INCENTIVE and $600/1MWh SREC)	similar projects	337,500	45,000	292,500	51,049	45.0	0	5.0	0	38,972	25	209,300	7.5	128	5	11	218,584	69,937
2.4	replace (33) old style Metal Halide lamps with pulse start Metal Halide lamps	RS Means, Lit Search, NJ Clean Energy Program	14,850	825	14,025	8,322	1.7	0	0.6	70	1,435	15	20,472	9.8	53	4	6	3,104	11,401
	TOTALS		**396,100**	**45,825**	**350,275**	**70,331**	**49.0**	**2,053**	**12.5**	**1,890**	**47,114**	**-**	**288,419**	**7.4**	**-**	**-**	**-**	**244,701**	**120,373**

1. HISTORIC ENERGY CONSUMPTION

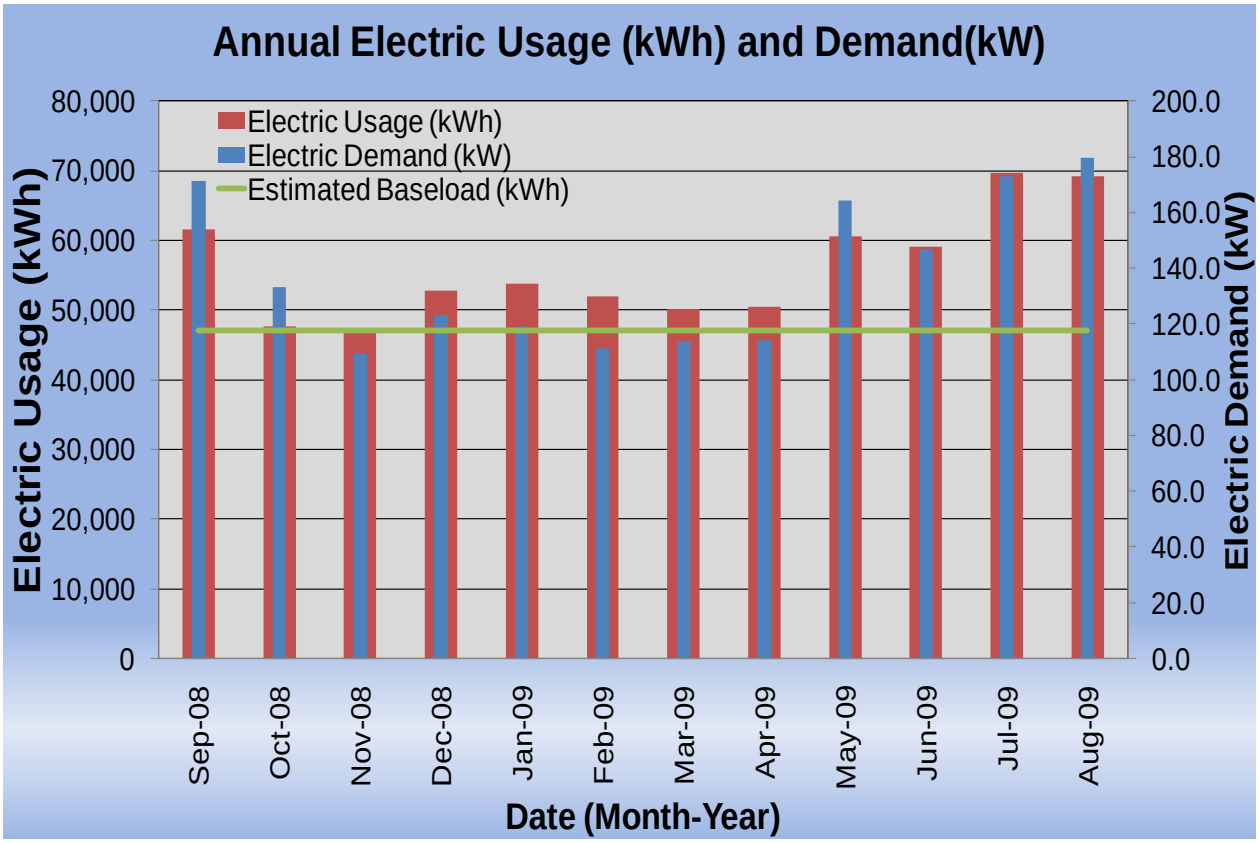
1.1. Energy usage and cost analysis

SWA analyzed utility bills from October 2007 through August 2009 that were received from the utility companies supplying the Mount Olive Municipal Building with electric and natural gas.

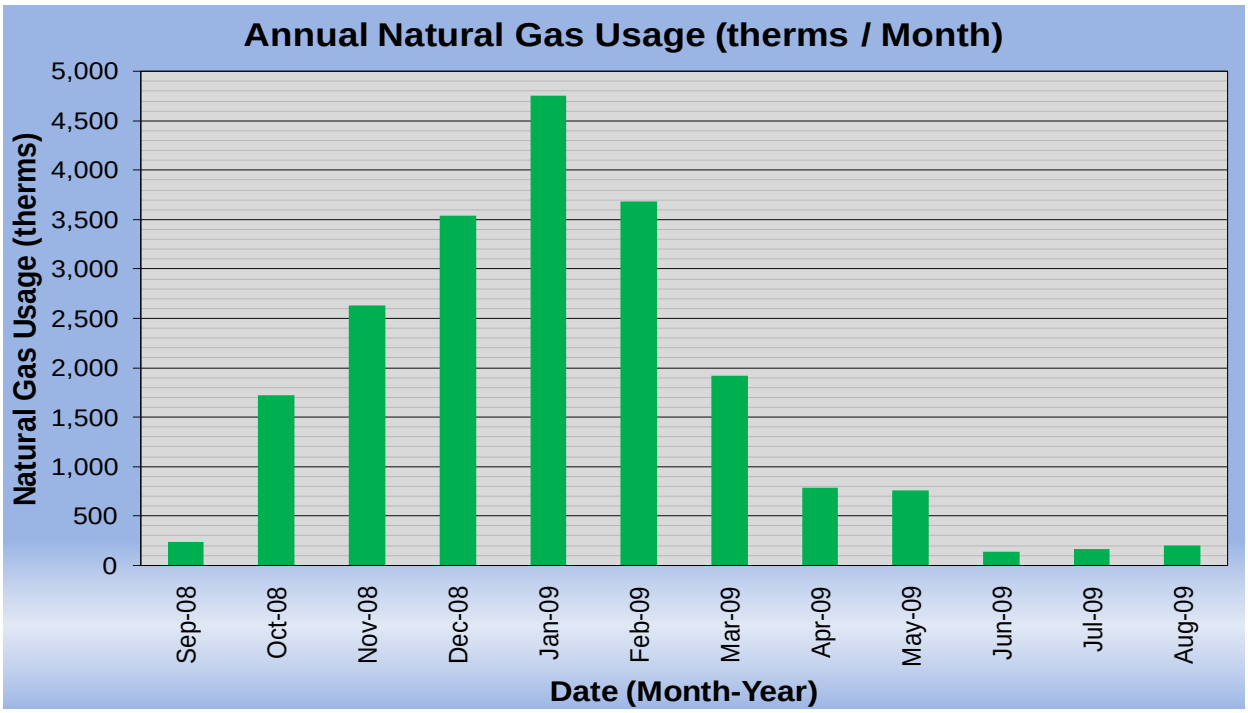
Electricity - The Mount Olive Municipal Building is currently served by one electric meter. The Mt. Olive Municipal Building currently buys electricity from JCP&L at **an average rate of $0.164/kWh** based on 12 months of utility bills from September 2008 and August 2009. The Mt. Olive Municipal Building purchased **approximately 674,080 kWh or $110,373 worth of electricity** in the previous year. The average monthly demand was 138 kW.

Natural gas - The Mount Olive Municipal Building is currently served by one meter for natural gas. The Mount Olive Municipal Building currently buys natural gas from Elizabethtown Gas Co. at **an average aggregated rate of $1.505/therm** based on 12 months of utility bills for September 2008 and August 2009. The Mount Olive Municipal Building purchased **approximately 20,530 therms or $30,907 worth of natural gas** in the previous year.

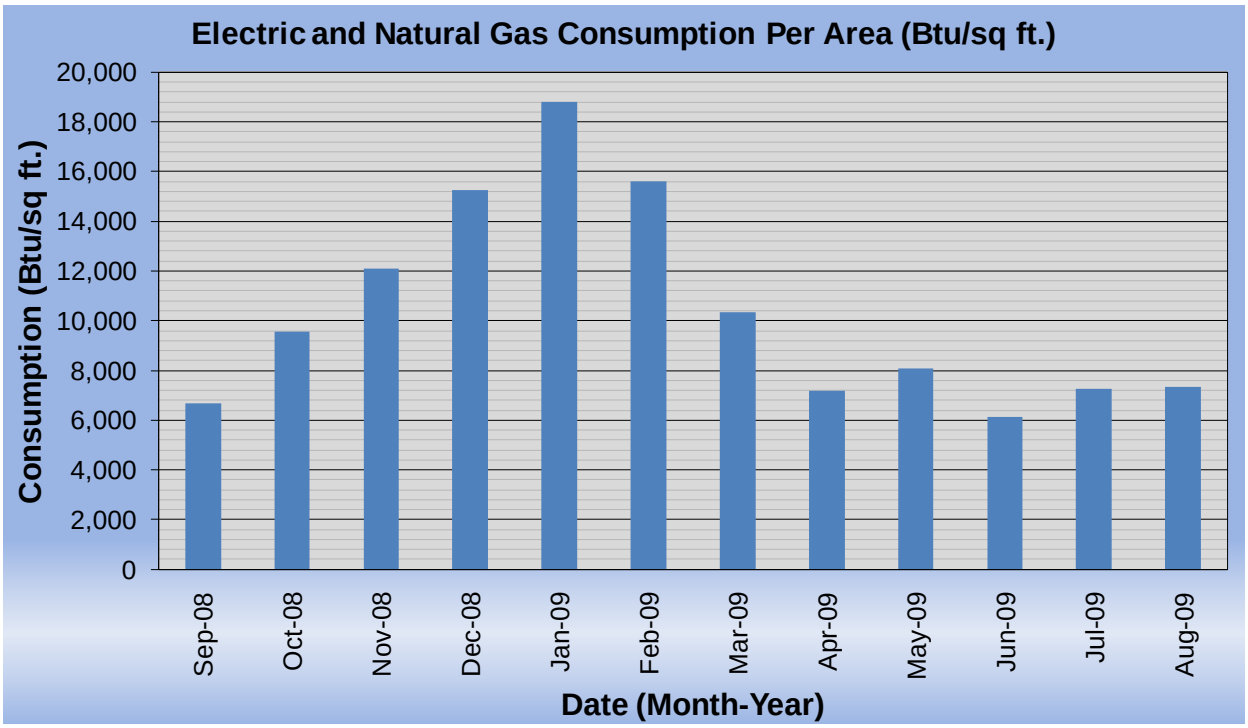
The following chart shows electricity use for the Mt. Olive Municipal Building based on utility bills for the 12 month period of September 2008 and August 2009.



The following chart shows the natural gas consumption for the Mt. Olive Municipal building based on natural gas bills for the 12 month period of September 2008 and August 2009.

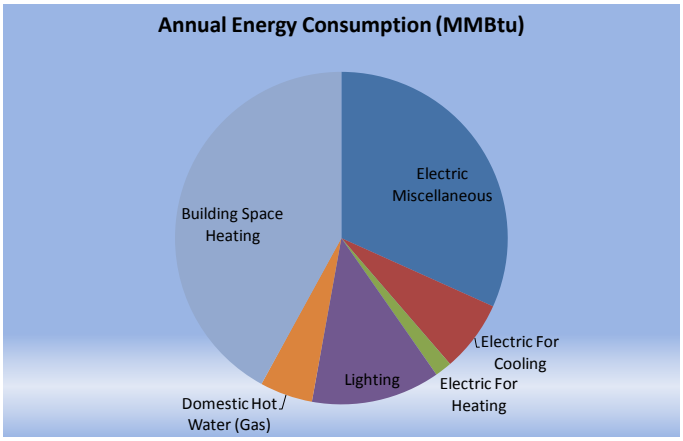


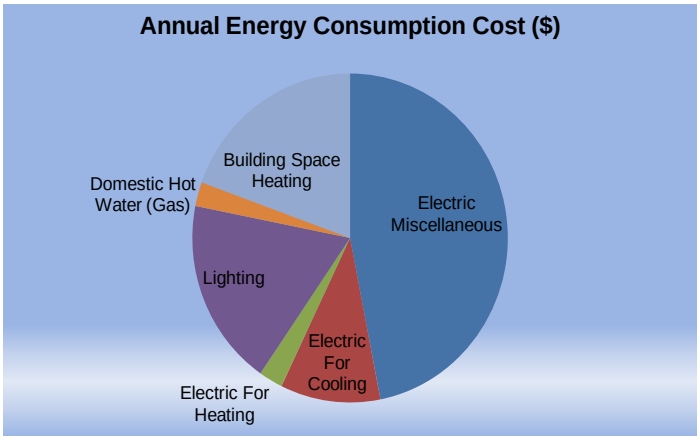
The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Mt. Olive Municipal building based on utility bills for the 12 month period of September 2008 and August 2009.



The following table and chart pies show energy use for the Mt. Olive Municipal building based on utility bills for the 12 month period of September 2008 and August 2009. Note electrical cost at $48/MMBtu of energy is more than 3 times as expensive to use as natural gas at $15/MMBtu.

2009 Annual Energy Consumption / Costs					
	MMBtu	**% MMBtu**	**$**	**% $**	**$/MMBtu**
Electric Miscellaneous	1,381	32%	$66,279	47%	48
Electric For Cooling	302	7%	$14,488	10%	48
Electric For Heating	72	2%	$3,458	2%	48
Lighting	545	13%	$26,148	19%	48
Domestic Hot Water (Gas)	224	5%	$3,365	2%	15
Building Space Heating	1,829	42%	$27,542	19%	15
Totals	4,353		$141,280	100%	32
Total Electric Usage	2,300	53%	$110,373	78%	48
Total Gas Usage	2,053	47%	$30,907	22%	15
Totals	4,353	100%	$141,280	100%	32





1.2. Utility rate

The Mt. Olive Municipal building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Mt. Olive Municipal building currently pays an average rate of approximately $0.164/kWh based on the 12 months of utility bills of September 2008 and August 2009.

The Mt. Olive Municipal building currently purchases natural gas supply from the Elizabethtown Gas Co. at a general service market rate for natural gas (therms). Elizabethtown Gas Co. also acts as the transport company. There is one gas meter that provides natural gas service to the Mt. Olive Municipal building currently. The average aggregated rate (supply and transport) for the meter is approximately $1.505/therm based on 12 months of utility bills for September 2008 and August 2009.

Some of the minor unusual utility fluctuations that showed up for a couple of months on the utility bills may be due to adjustments between estimated and actual meter readings.

1.3. Energy benchmarking

SWA has entered energy information about the Mt. Olive Municipal / Police Department building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This mixed use facility (township offices / police station / courthouse) is comprised of non-eligible (Other) space type. Police Station / Courthouse space or "Other" can be used to classify a facility or a portion of a facility where the primary activity does not fall into any of the available space types. Consequently, the Mt. Olive Municipal / Police Department building is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 124 kBtu/sq ft yr compared to the national average of a township offices / police station building consuming 78 kBtu/sq ft yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 2.4 kBtu/sqft yr, with an additional 12.5 kBtu/sq ft yr from the recommended ECMs and 27.8 kBtu/sq ft yr from improved ceiling insulation upgrades. These recommendations and discounting 5 kBtu/sq ft yr use to maintain the server room cool, could account for at least 47.6 kBtu/sq ft yr reduction, which when implemented would make the building energy consumption better than the national average.

Per the LGEA program requirements, SWA has assisted the Township of Mount Olive to create an *Energy Star Portfolio Manager* account and share the Mt. Olive Municipal Building facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager site information with the Township of Mount Olive (user name of "mtolivetwp" with a password of "mtolivetwp") and TRC Energy Services (user name of TRC-LGEA).

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Township of Mount Olive - Municipal Building

Building ID: 1924925
For 12-month Period Ending: August 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 23, 2009

Facility
Township of Mount Olive - Municipal Building
204 Flanders-Drakestown Road
Budd Lake, NJ 07828

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1998
Gross Floor Area (ft²): 35,000

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	2,299,961
Natural Gas (kBtu)[4]	2,050,081
Total Energy (kBtu)	4,350,042

Energy Intensity[5]

Site (kBtu/ft²/yr)	124
Source (kBtu/ft²/yr)	281

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	459

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	79%
Building Type	Fire Station/Police Station

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.

Certifying Professional
N/A

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**

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.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Mount Olive Municipal Building main building was originally built in 1998, without any major renovations or additions since then. The building is composed of three major sections. The left side houses the Court, the Health Department, the Senior and Social Services. The right side houses the Building, the Planning and Zoning, the Fire Marshall, the Public Works, the Recreation and the Finance Departments and a conference room. The center section houses the Police, the Administration Departments, a conference room, the Cafeteria and the Council Room. The building consists of 35,000 square feet of conditioned space.

2.2. Building occupancy profiles

Occupancy for the entire Mt. Olive Municipal building area is approximately 105 employees and staff personnel. The building is open weekdays 8:30 AM - 4:30 PM. Evening meetings and the Court keep part of the building open Mondays till 7:30 PM and 3-5 nights / week to 10:00 PM. The Police Department operates 24 hrs / 7 days with 26-30 employees during the daytime and 8 at night.

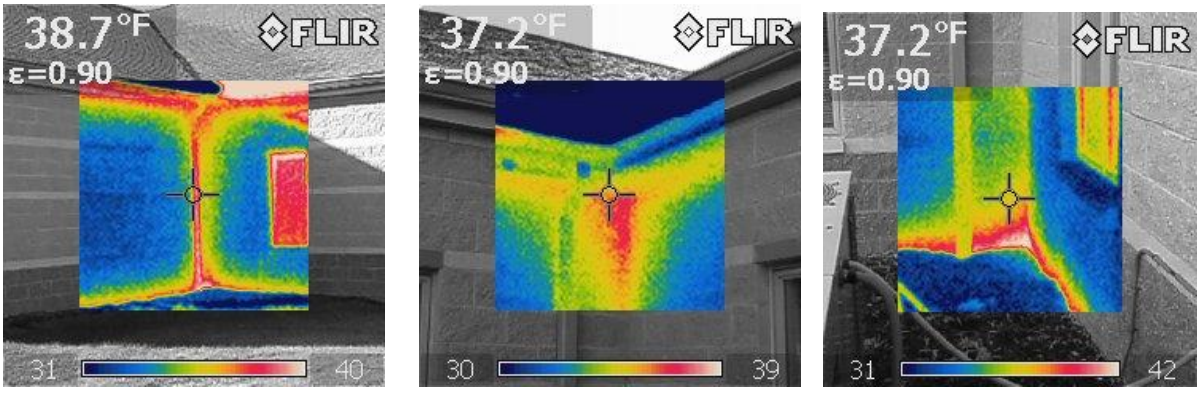
2.3. Building envelope

2.3.1.Exterior Walls

The exterior building wall envelope is split block veneer on a metal stud frame with a gypsum wall board interior finish. Installed insulation, where visible, was consistent with the information on the available drawings, namely 5.5" fiberglass batt in stud cavities.

The veneer walls were inspected and found to be in acceptable condition, except in some areas where age and compromised installation techniques show first signs of needing repair in addition to lack of wall insulation revealed by infrared technology.

In the various buildings Departments, indoor moisture and temperature complaints were voiced and noted. Occupants mentioned the lack of moisture barriers being the cause. This was investigated and found not to be the cause for occupant discomfort. For more information regarding HVAC and comfort issues please refer to the relevant 2.4 sections in this report.



IR images revealing possible moisture related issues

Caulk and mortar issues

SWA recommends fixing all faulty or missing caulk and mortar related areas to prevent costly future repairs and energy losses. SWA also recommends low insulation levels in exterior walls to be further examined. A separate inspection would help identify specific areas when weather conditions are more favorable to use infrared technology.

2.3.2.Roof

The low sloped roof has a medium colored asphalt shingle type finish over supportive steal decking and framing. The condition of the 11 year old roof was inspected from the exterior and found to be age appropriate with leaks reported only in the Police Department area where antennas were installed. At the time of the field audit, ceiling tiles throughout the building showed signs of leakage but the cause was suggested to be plumbing and HVAC equipment located in the ceiling cavity. Downspouts and gutters where visually inspected and found to be in good condition.

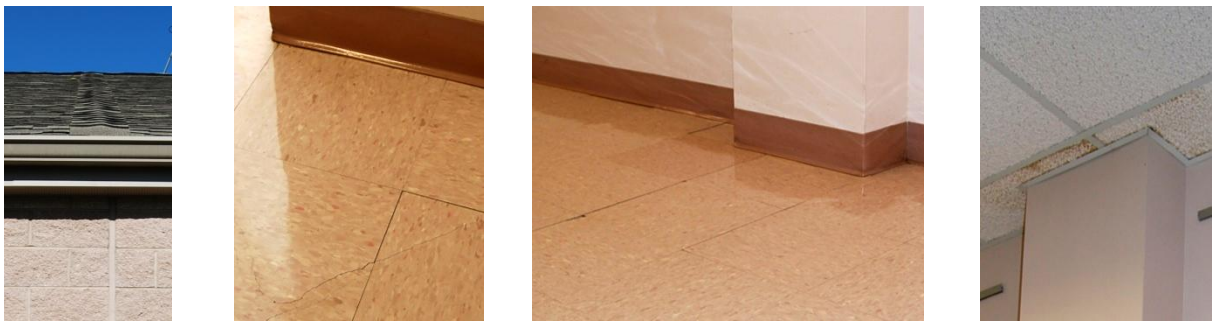
Insulation was found to be unevenly distributed or missing on top of the ceiling tiles. Attic ventilation was found to be provided by passive gable end vents.

Unevenly distributed or missing 10" fiberglass batt insulation on top of ceiling tiles

SWA recommends inspecting the entire ceiling insulation for missing, overlapping or uneven fiberglass batts insulation. Also, SWA recommends installing / inspecting soffit and ridge vents in an effort to minimize summer cooling loads. Passive gable end vents should be closed / blocked due to their ineffectiveness.

2.3.3.Base

The building's base is a 4" concrete slab-on grade with a perimeter footing. Substantial seasonal slab and column base movements were reported and noticed, especially around the area of the expansion joint, reaching from front to back of the main section of the building. Interior floor and ceiling tile combined with structural and moisture related wall damages were observed.



Expansion joint, interior structural and water damages

Due to the energy related nature of this audit, SWA recommends having the building structurally evaluated in the areas affected by the mentioned seasonal slab and footing movements. Site drainage or soils conditions could amplify moisture issues caused by hidden roof leaks, especially in the area of the building expansion joint.

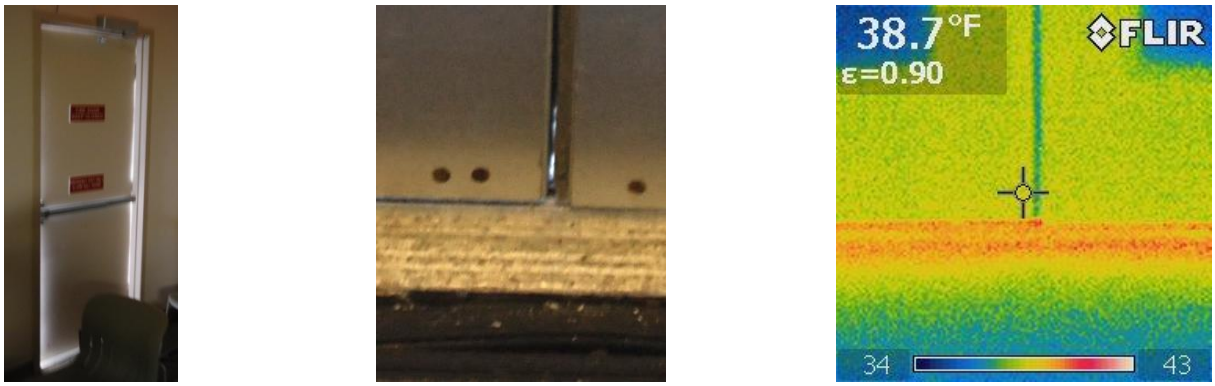
2.3.4.Windows

Windows were found to be low-e type, double glazed, mostly fixed units and in good condition. SWA recommends having all caulking at windows inspected regularly and replaced as necessary.

2.3.5.Exterior doors

The aluminum exterior doors were inspected and observed to be in good condition except for some weather-stripping that started to show wear and tear at the time of the inspection.

SWA recommends that the exterior doors of the building be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals. Tight seals around doors will help ensure the building to be is kept continuously insulated.



Signs of worn or missing weather stripping at some doors

2.3.6.Building air tightness

In addition to the above mentioned recommendations SWA suggests air sealing, caulking and / or insulating around all plumbing, electrical, HVAC and structural envelope penetrations. This should include bottom and top plates, recessed light fixtures, electrical boxes, windows and sleeve air conditioner units.

The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

The Mount Olive Municipal Building is heated / cooled by multiple independent systems. There are 17 natural gas fired furnaces on catwalks in the attic / fan room area, 3 overhead electric vestibule heaters and 14 AC condensing units next to the building.

2.4.1.Heating

The heating (and cooling) to the several building spaces is provided by 12 Air Handlers of various capacities located above building ceilings on catwalks. A typical arrangement draws fresh air via a plenum equipped with a bird screen and brings it into a mixing box where it is combined with return air. A small portion of the return air is purged and vented outside via an exhaust fan prior to entering the mixing box. The mixed air inside the air handler is filtered before passing through a DX coil (which is active a cools air during the summer months). The air handler blower then pushed the air through a gas duct furnace before the conditioned air is distributed via diffusers into the building spaces. The gas fired furnaces have two stage controls with solid state ignition.

There is a heating / cooling / ventilation schedule programmed into the Auto Matrix BMS control system; however there isn't any longer service or support available and there has not been any ability to access the software for a couple of years. 40% of the BMS has been migrated over to individual area programmable thermostats. 60% of the existing BMS control system is on automatic pilot and very difficult to control or manually redirect desired changes.

New independent temperature controls migrated away from the BMS system

Each air handler has its associated distribution ductwork. This segmented ductwork makes for difficult job to air balance the building. Occupants complain about comfort levels (i.e.: The Cafeteria is very cold while the Administration area is very hot; during peak summer months there is high

humidity in the building). There are problems with rain and birds coming into the ducts through the intakes. SWA observed that many of the attic metal ducts are leaking at seams. Air filters are replaced quarterly.

In general, the air handlers have 30% estimated useful operating life left.

2.4.2. Cooling

The Mt. Olive Municipal building is provided with cooling via the air handlers DX coils (described above) and condensing units located on the perimeter around the building, which have dual compressors and two independent circuits. The server room is cooled by two split units, totaling slightly over 2 Tons of refrigeration.

The Mount Olive had to replace prematurely a burnt out motor on a condenser last summer. The Mount Olive Maintenance Department complains that the building experiences blackouts and incoming electrical phase imbalances often through the years and they believe that one of these events triggered the motor to burn out.

In general, the outdoor condensers have 30% estimated useful operating life left.

Two small server room condensing units next to a corner building space condenser

2.4.3. Ventilation

The various spaces of the building are ventilated by the air handler units and associated fractional HP ventilators that serve the respective spaces as described in the “Heating” and “Cooling” sections above. Bathrooms also have exhaust fans that purge toilets to the outside via plenums with bird screen covers. In general, the building exhaust fans have 30% estimated useful operating life left.

Roof exhaust fan discharge plenum

2.4.4.Domestic Hot Water

The domestic hot water (DHW) for the Mt. Olive Municipal building is provided by an AO Smith BTC 197 970 with a 100 gal storage and 197,000 Btu/hr input. This heater has 20% estimated useful operating life left and appears in good condition. Considerations should be given to replacing it with a high efficiency condensing type heater when it has reached the end of its operating life in a couple of years.

Domestic Hot Water heater with automated closing flue gas damper

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Mt. Olive Municipal building currently consists of mostly T8 fluorescent fixtures with electronic ballasts. Based on measurements of lighting levels for each space, there are not any vastly over-illuminated areas. SWA recommends installing occupancy sensors in bathrooms, closets, offices and areas that are occupied only part of the day and payback on savings are justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion or sound is detected within a set time period. SWA recommends daylight sensors for hallways that receive natural light. These on / off photo-sensors are single zone switching devices designed for closed loop day-lighting applications. They include advanced digital multi-band photo-sensors positioned behind a wide angle cone that cuts off unwanted light, preventing false triggers; on-board microcontrollers; and LCD displays. They have an extended range of 1-1,400 foot-candles. SWA also recommends replacing a few T12 fixtures and magnetic ballasts with T5 fixtures and electronic ballast. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Lights - Exit signs were found to be LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp fixtures. Exterior lighting is controlled by photocells. SWA recommends replacing the Metal Halide lamps with pulse start Metal Halide lamps. Pulse-start metal halide (MH) lamps offer the advantages of standard (probe-start) MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. SWA is not recommending at this time any upgrades to the exterior photocells.

2.5.2. Appliances and process

Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov. Also, energy vending miser devices are now available for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions in meeting areas use approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances (i.e. fridges, coffee makers, televisions, etc) be plugged in to power strips and turned off each evening just as the lights are turned off. The Mount Olive Municipal Building computers are generally NOT programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3. Elevators

The Mount Olive Municipal Building is a single-story building without elevators.

2.5.4. Others electrical systems

Besides an emergency 80 kVA generator used for emergency back-up (which appears in good condition), there are not currently any other significant energy impacting electrical systems installed at the Mt. Olive Municipal building.

SWA has been told that the Municipal Building experiences frequent power outages, electrical phase imbalances, as well as go through relatively a lot of lamp bulb and ballast changes throughout the year. SWA recommends that the Municipal Building record incoming power phases to the building. Perhaps, ask the utility company, JCP&L, to megger feeds to the main transformer buses. On the whole, megger testing is non destructive. What happens is a DC voltage is applied to the cable under test. It is an insulation test to see if the insulation has been compromised in any way to cause a short circuit when normal power is applied to it. There may be some phase imbalance and / or grounding. Also the Township of Mt. Olive should determine if weekly generator tests are shortening the life of light bulbs in the building or damaging any motor drives. The Township may also want to investigate surge suppressors for the main transformer. Many of the places SWA visits are very happy with the T8s and have not changed any ballasts for long periods of time.

3. EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Equip Age	Estimated Remaining Useful Life %
Air Handler / Heating - Cooling	AC-1, 15 Ton	wing A, above bathroom	Trane TTE/TTA180B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-2, 7.5 Ton	wing A, above bathroom	Trane TTE/TTA090B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-3, 12.5 Ton	wing B, above bathroom and corridor	Trane TTE/TTA150B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-4, 15 Ton	wing B, above bathroom	Trane TTE/TTA180B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-5, 150,000 btu/hr input, 120,000 btu/hr output, 20 Ton	wing B, above mech room	Trane TTE/TTA240B, GDND015AEE1000KL	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-6, 12.5 Ton	wing B, above mech room	Trane TTE/TTA150B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-7, 12.5 Ton	wing C, above ceiling	Trane TTE/TTA150B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-8, 15 Ton	wing C, above bathroom	Trane TTE/TTA180B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-9, 10 Ton	wing D, above ceiling	Trane TTE/TTA120B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-10, 10 Ton	wing D, above ceiling	Trane TTE/TTA120B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-11, 15 Ton	wing D, above bathroom	Trane TTE/TTA180B	Natural Gas / Electric	Municipal Building	1998	30%
Air Handler / Heating - Cooling	AC-12, 5 Ton with low ambient operation control	wing C, above ceiling	Trane TTE060.140A/TTA060B	Natural Gas / Electric	Municipal Building	1998	30%

continued on the next page

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Building System	Description	Location	Model #	Fuel	Space Served	Equip Age	Estimated Remaining Useful Life %
Air Handler / Cooling	AC-13 primary air handler	condenser outside, evaporator above Server Room	Fujitsu Halcyon	Electric	Server Room	2003	60%
Air Handler / Cooling	AC-14 secondary air handler	condenser outside, evaporator above Server Room	Mitsubishi Electric Mr. Slim	Electric	Server Room	2003	60%
Heating	12 duct gas Reznor furnaces	with each AC unit in fan rooms above ceilings	Reznor	Natural Gas	Municipal Building	1998	50%
Cooling	1 x condensers besides the bldg	outside on bldg perimeter	Trane TTA090A400CC	Electric	Municipal Building	1998	30%
Cooling	3 x condensers besides the bldg	outside on bldg perimeter	Trane TTA150B400BC	Electric	Municipal Building	1998	30%
Cooling	4 x condensers besides the bldg	outside on bldg perimeter	Trane TTA180B400CC	Electric	Municipal Building	1998	30%
Cooling	1 x condensers besides the bldg for dispatch	outside on bldg perimeter	Trane HABA-W060SA	Electric	Municipal Building	1998	30%
Cooling	1 x condensers besides the bldg	outside on bldg perimeter	Trane TTA240B400FB	Electric	Municipal Building	2008	90%
Cooling	2 x condensers besides the bldg	outside on bldg perimeter	Trane TTA120B400BC	Electric	Municipal Building	1998	30%
Cooling	1st server room condenser, 18,000 Btu/hr cooling capacity	outside on bldg perimeter, facing main entry road	Fujitsu Halcyon Inverter AOU18cl	Electric	Server Room	2003	60%
Cooling	2nd server room condenser, 8,500 Btu/hr cooling capacity	outside on bldg perimeter, facing main entry road	Mitsubishi Electric Mr. Slim MU09NW2	Electric	Server Room	2003	60%
Ventilation	18 exhaust fans	mostly with each AC unit in fan rooms above ceilings, several serving bathrooms	L Cook	Electric	Municipal Building	1998	30%
Domestic Hot Water	100 gal storage, 197,000 Btu/hr input also supports 5 showers in Police Dept.	mech room	AO Smith BTC 197 970	Natural Gas	Municipal Building	1998	20%
Generator	80 KVA	outside on bldg perimeter	Spectrum gen 80GS60, Ford Engine LSG-8731-6003-A	Natural Gas / Electric	Police Dept., Municipal Building	1998	50%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Municipal Building	1998	varies, average 30%

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Mount Olive Municipal Building, SWA has separated the investment opportunities into three recommended categories:

1. Capital Improvements - Upgrades not directly associated with energy savings
2. Operations and Maintenance - Low Cost / No Cost Measures
3. Energy Conservation Measures - Higher cost upgrades with associated energy savings

Category I Recommendations: Capital Improvements

- Upgrade Building Management System (BMS) - There is a heating / cooling / ventilation schedule programmed into the Auto Matrix BMS control system; however there isn't any longer service or support available and there has not been any ability to access the software for a couple of years. 40% of the BMS has been migrated over to individual area programmable thermostats. 60% of the existing BMS control system is on automatic pilot and very difficult to control or manually redirect desired changes. The BMS should be replaced / upgraded to control the building spaces as designed and as part of the capital improvement recommendations. This upgrade will result in energy savings via improved temperature control. This recommendation will ensure that the retro-commissioning estimated savings (per ECM#4) are maintained and reproducible.

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

- Install revolving doors - to relieve pressure from building at entrance doors. SWA was told by some of the building occupants that because the building is exposed to prevailing winds, hallways can sometimes become wind tunnels when exterior doors are opened - even with the double door air locks in place. The revolving door is always closed, so wind and drafts cannot blow into the building, also efficiently minimizing heating and air conditioning loads.

Category II Recommendations: Operations and Maintenance

- Air balance distributed conditioned air - for uniform and steady temperature control.

- Evaluate the building base - Substantial seasonal slab and column base movements were reported and noticed, especially around the area of the expansion joint, reaching from front to back of the main section of the building. Interior floor and ceiling tile combined with structural and moisture related wall damages were observed. SWA recommends having the building structurally evaluated in the areas affected by the mentioned seasonal slab and footing movements. Site drainage or soils conditions could amplify moisture issues caused by hidden roof leaks, especially in the area of the building expansion joint.

- Thoroughly and evenly insulate space (with batt insulation) above the ceiling tiles and plug all ceiling penetration. All missing ceiling tiles including those in the mechanical room should be put back in place. Air ducting should be gasketed to prevent conditioned air from escaping / leaking into the attic space.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.

- Maintain downspouts - Repair / install missing downspouts as needed to prevent water / moisture infiltration and insulation damage.

- Provide weather stripping / air sealing - SWA observed that exterior door weather-stripping in places was beginning to deteriorate. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Repair / seal wall cracks and penetrations - SWA recommends as part of the maintenance program to install weep holes, install proper flashing, and correct masonry efflorescence and seal wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.

- Provide water efficient fixtures and controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and / or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.

- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.

- Check electrical feeds to the building for grounding - to ensure that the 3 electrical phase are balanced.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize their energy use. The US Department of Energy offers free information for hosting energy efficiency educational programs and plans, for more information please visit: http://www1.eere.energy.gov/education/ .

Category III Recommendations: Energy Conservation Measures - Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	install Drinks and Snacks vending machine energy misers
2.1, 2.2 2.3 & 2.4	install daylight and occupancy sensors, replace T12 with T8 fixtures and Metal Halide with pulse start Metal Halide fixtures
3	install 7.5 kW Wind rooftop system
	Description of Recommended 5-10 Year Payback ECMs
4	retro-commission mechanical equipment
5	install 45 kW PV rooftop system

ECM#1: *Install Vending Misers*

Description:

The Mt. Olive Municipal building has one Drinks and one Snacks vending machines located in the Cafeteria / break room. Energy vending miser devices are now available for conserving energy with these vending machines and coolers. There isn't a need to purchase new machines to reduce operating costs and greenhouse gas emissions. When equipped with the vending miser devices, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the vending machine. Vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

Snacks vending miser devices can be used on Snacks vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snacks vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up.

Installation cost:

Estimated installed cost: $458
Source of cost estimate: www.usatech.com *and established costs*

Economics (without incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
1	install 1 Drinks and 1 Snacks vending machine energy misers - in cafeteria / break room	www.usatech.com and established costs	458	none at this time	458	1,999	0.4	0	0.2	0	328	12	3,934	1.4	759	63	71	2,805	2,739

Assumptions: SWA assumes energy savings based modeling calculator found at www.usatech.com or http://www.usatech.com/energy_management/energy_calculator.php

Rebates/financial incentives:

This measure does not qualify for a rebate or other financial incentive at this time.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#2: *Building Lighting Upgrades*

Description:

On the days of the site visits, SWA completed a lighting inventory of the Mt. Olive Municipal building (see Appendix A). The existing lighting consists of mostly T8 fluorescent fixtures with electronic ballasts. SWA recommends installing occupancy sensors in bathrooms, closets, offices and areas that are occupied only part of the day and payback on savings are justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion or sound is detected within a set time period. SWA recommends daylight sensors for hallways that receive natural light. These on / off photo-sensors are single zone switching devices designed for closed loop day-lighting applications. They include advanced digital multi-band photo-sensors positioned behind a wide angle cone that cuts off unwanted light, preventing false triggers; on-board microcontrollers; and LCD displays. They have an extended range of 1-1,400 foot-candles. SWA also recommends replacing a few T12 fixtures and magnetic ballasts with T5 fixtures and electronic ballast. SWA recommends replacing the Metal Halide lamps with pulse start Metal Halide lamps. Pulse-start metal halide (MH) lamps offer the advantages of standard (probe-start) MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Mount Olive may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $19,425
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics (Some of the options considered with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
2.1	install (7) daylight sensors on hallways and lobby	RS Means, Lit Search, NJ Clean Energy Program	1,540	175	1,365	3,377	0.7	0	0.2	18	571	12	6,646	2.4	402	34	41	4,322	4,626
2.2	install (17) occupancy sensors	RS Means, Lit Search, NJ Clean Energy Program	3,740	425	3,315	4,525	0.9	0	0.3	18	760	12	8,905	4.4	175	15	20	4,246	6,199
2.3	replace (4) T12 with T8 fixtures	RS Means, Lit Search, NJ Clean Energy Program	840	120	720	806	0.2	0	0.1	18	150	15	1,983	4.8	212	14	19	1,067	1,104
2.4	replace (33) old style Metal Halide lamps with pulse start Metal Halide lamps	RS Means, Lit Search, NJ Clean Energy Program	14,850	825	14,025	8,322	1.7	0	0.6	70	1,435	15	20,472	9.8	53	4	6	3,104	11,401
	TOTALS		**20,970**	**1,545**	**19,425**	**17,030**	**3.5**	**0**	**1.2**	**123**	**2,915**	**-**	**38,006**	**6.7**	**-**	**-**	**-**	**12,739**	**23,331**

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 3.5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - Daylight dimmers / sensors ($25 per control) - Maximum incentive amount is $175.*
- *NJ Clean Energy - Wall Mounted occupancy sensors ($25 per control) - Maximum incentive amount is $425.*
- *NJ Clean Energy - T5 and T8 lamps with electronic ballast in existing facilities ($10-30 per fixture, depending on quantity and lamps) Maximum incentive amount is $120.*
- *NJ Clean Energy - Metal Halide with pulse start ($25 per fixture) - Maximum incentive amount is $825.*

Options for funding the Lighting ECM: *This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#3: *Install 7.5 kW Wind system*

Description:

Wind power production may be applicable for the Mount Olive Municipal building location, because of the thermal winds generated in the area. Currently, the Mount Olive Municipal building does not use any renewable energy systems. Updated renewable energy systems such as "magnetic" vertical axis wind turbines (MVAWT) can be mounted on building roofs offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Wind systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA presents below the economics of installing a 7.5 kW Wind system to offset electrical demand for the building and reduce the annual net electric consumption for the building, however there are insufficient guaranteed incentives for NJ rebates at this time for this investment. The Mount Olive Municipal building is not eligible for a 30% federal tax credit. The Mount Olive Municipal building may consider applying for a grant and / or engage a Wind Power generator / leaser who would install the Wind system and then sell the power at a reduced rate.

There are many possible locations for a 7.5kW Wind system installation on top of the building ample roof area. The supplier would need to first determine via recorded analysis at the proposed location(s) consistency and wind speeds available. Area winds of 10 mph will run turbines smoothly and capture the needed power. This is a roof-mounted wind turbine (used for generating electricity) that spins around a vertical axis like a merry-go-round instead of like a windmill, as do more traditional horizontal axis wind turbines (HAWTs). A typical 7.5 kW MVAWT wind system has a 20 ft diameter turbine by 10 ft tall.

The installation of a renewable Wind power generating system could serve as a good educational tool and exhibit for the community. **It is very important that Wind measurements and recordings are taken at the chosen location for at least a couple of months to assure that sufficient wind and speed is available for proper operation and to meet incentive requirements.**

Installation cost:

Estimated installed cost: $60,000
Source of cost estimate: Similar projects

Economics (with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
3	install 7.5 kW Wind rooftop system (with $3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	1.5	0	2,604	25	65,098	3.5	608	24	28	36,150	21,752

Assumptions: SWA estimated the cost and savings of the system based on past wind projects. SWA projected physical dimensions based on a 7.5 kW-Enviro Energies turbine system. **SWA assumes that the relatively low height (~30 ft) compared to the taller horizontal axis turbines is acceptable to the NJ BPU as long as the average documented annual wind speed is 11 mph at the hub.**

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive at this time only for vertically spinning high altitude turbines
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Wind Upfront Incentive Program, Expected performance buy-down (EPBB) is modeled on an annual kWh production of 1-16,000 kWh for a $3.20/kWh upfront incentive level. This has been incorporated in the above costs, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#4: *Retro-Commissioning*

Description:

Retro-commissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, retro-commissioning can often resolve problems that occurred during design or construction and / or address problems that have developed throughout the building's life. Owners often undertake retro-commissioning to optimize building systems, reduce operating costs, and address comfort complaints from building occupants.

Since the systems at the Mt. Olive Municipal building have undergone some renovations in recent years, and the building continues to have concerns with thermal comfort control, SWA recommends undertaking retro-commissioning to optimize system operation as a follow-up to completion of the upgrades. The retro-commissioning process should include a review of existing operational parameters for both newer and older installed equipment. During retro-commissioning, the individual loop temperatures should also be reviewed to identify opportunities for optimizing system performance.

Installation cost:

Estimated installed cost: $43,750
Source of cost estimate: Similar projects

Economics (without incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
4	retro commission-ing	similar projects	43,750	none at this time	43,750	10,960	2.3	2,053	6.9	1,820	6,707	12	58,646	6.5	84	7	11	23,014	39,035

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the amount of energy used for heating and cooling the Mt. Olive Municipal building. Based on experience with similar buildings, SWA estimated the heating and cooling energy consumption. Typical savings for retro-commissioning range from 5-20%, as a percentage of the total space conditioning consumption. SWA assumed 10% savings. Estimated costs for retro-commissioning range from $0.50-$2.00 per square foot. SWA assumed $1.25 per square foot of a

total square footage of 35,000. SWA also assumed on the average 1 hr/wk operational savings when systems are operating per design vs. the need to make more frequent adjustments.

Rebates / financial incentives:

There are currently no incentives for this measure at this time.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#5: *Install 45 kW PV system*

Description:

Currently, the Mt. Olive Municipal building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs, and can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA presents below the economics, and recommends at this time that Township of Mount Olive further review installing a 45 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Mt. Olive Municipal building is not eligible for a 30% federal tax credit. Instead, the Township of Mount Olive may consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. JCP&L provides the ability to buy SRECs at $600 / MWh or best market offer.

There are many possible locations for a 45 kW PV installation on the building roofs and away from shade. A commercial multi-crystalline 230 Watts panel (37.0 volts, 8.24 amps) has 17.5 square feet of surface area (13. 1 Watts per square foot). A 45 kW system needs approximately 194 panels, which would take up 3,424 square feet. The installation of a renewable Solar Photovoltaic power generating system could also serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $292,500
Source of cost estimate: Similar projects

Economics (with incentives):

ECM #	ECM description	source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
5	install 45 kW PV rooftop system (with $1/W INCENTIVE and $600/1MWh SREC)	similar projects	337,500	45,000	292,500	51,049	45.0	0	5.0	0	38,972	25	209,300	7.5	128	5	11	218,584	69,937

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (230 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $1.00 / watt Solar PV application for systems 50kW or less. Incentive amount for this application is $45,000 for the Mt. Olive Municipal building.

http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total of $30,600 / year has been incorporated in the above costs for the Township of Mount Olive, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There aren't currently any existing renewable energy systems.

5.2. Wind

Description:

Pleases see the above recommended ECM#3.

5.3. Solar Photovoltaic

Pleases see the above recommended ECM#5.

5.4. Solar Thermal Collectors

Description:

Solar thermal collectors are not cost effective for this building and would not be recommended due to the insufficient and not constant use of domestic hot water throughout the building to justify the expenditure.

5.5. Combined Heat and Power

Description:

CHP is not applicable for this building because of several existing split system cooling and insufficient domestic hot water use.

5.6. Geothermal

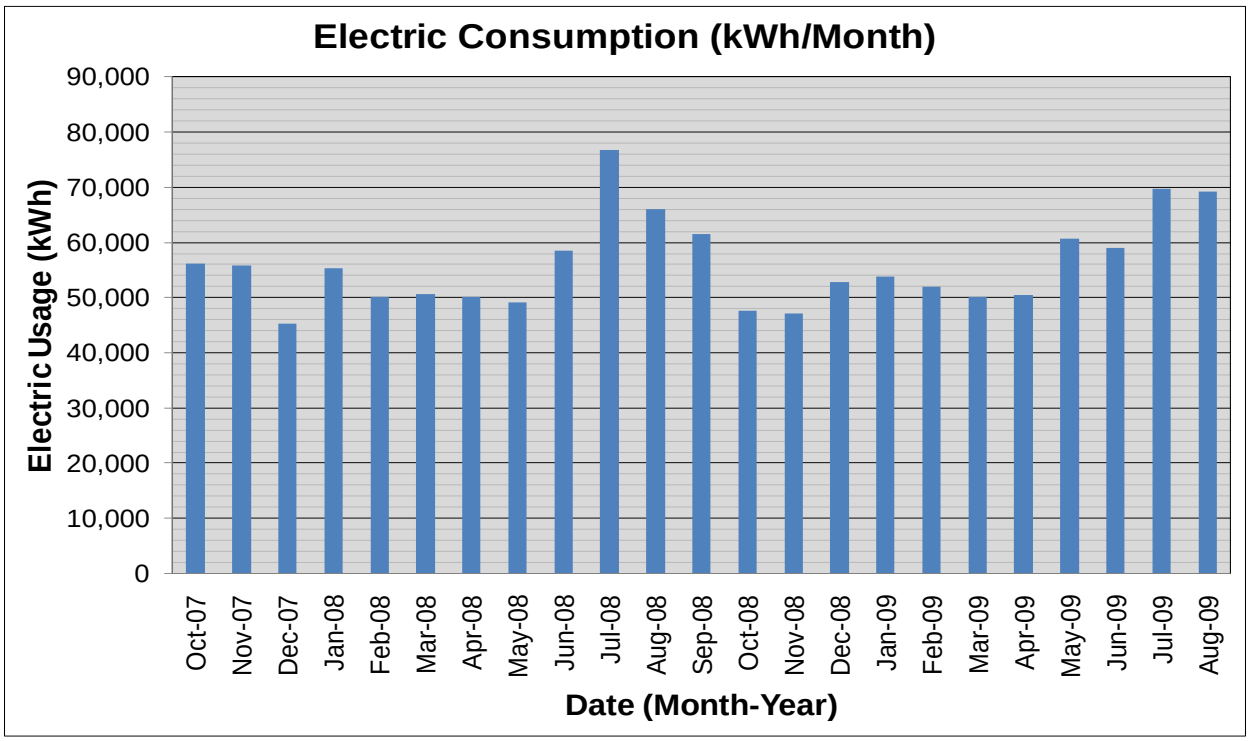
Description:

Geothermal is not applicable for this building because it would not be cost effective, since it would require replacement of the existing HVAC system, of which major components still have as a whole a number of useful operating years.

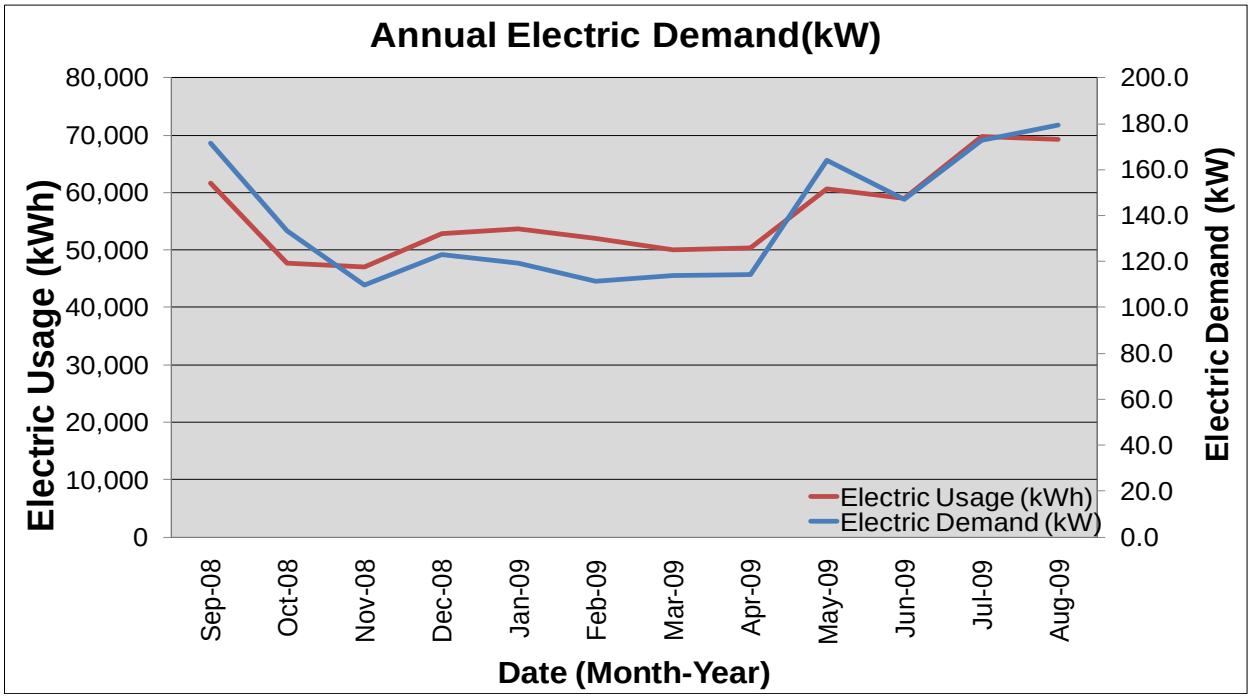
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

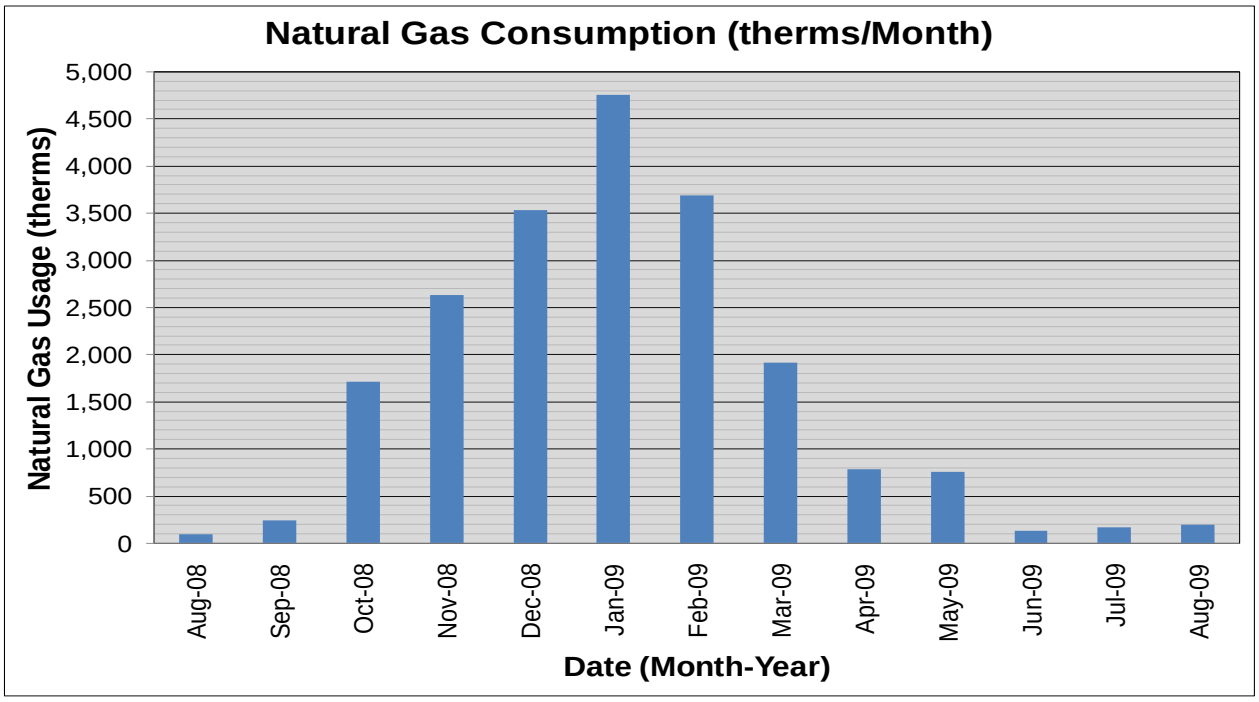
The following are charts that show the annual electric and natural gas load profiles for the Mount Olive Municipal building.

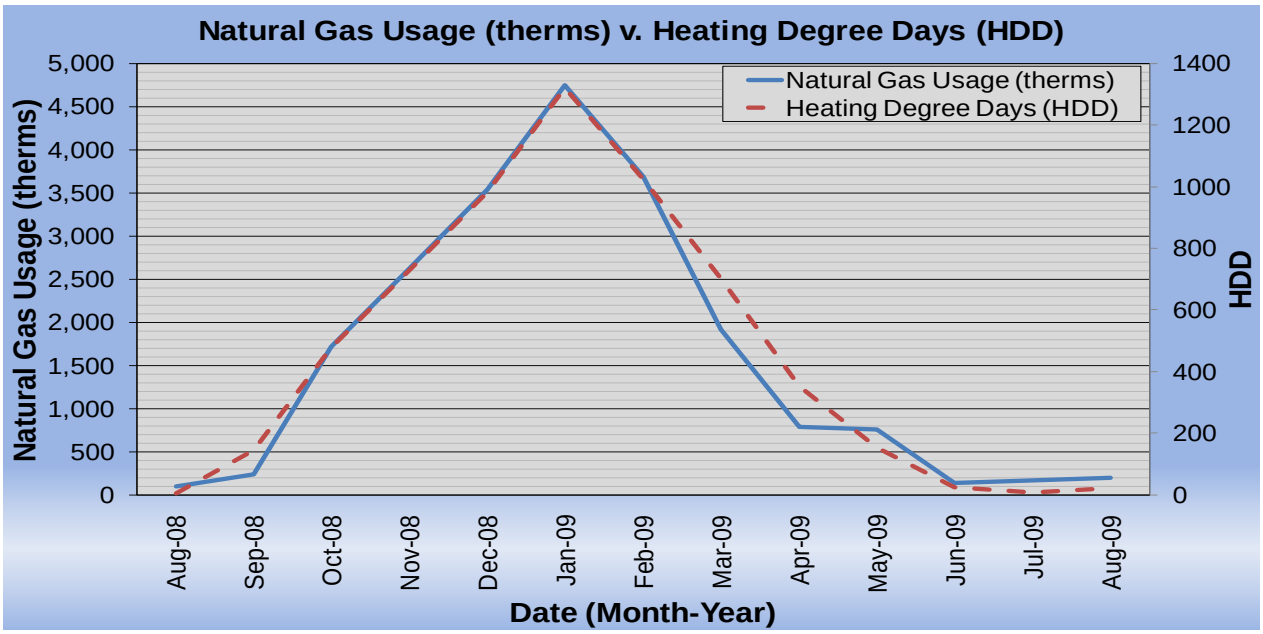


Some minor unusual electric fluctuations shown may be due to adjustments between estimated and actual meter readings. Also, note on the following chart how the electrical Demand peaks (except for a few unusual fluctuation anomalies) follow the electrical consumption peaks.



The following is a chart of the natural gas annual load profile for the building, peaking in the coldest months of the year and a chart showing natural gas consumption following the "heating degree days" curve. Some utility bills have more than one month estimated and combined.

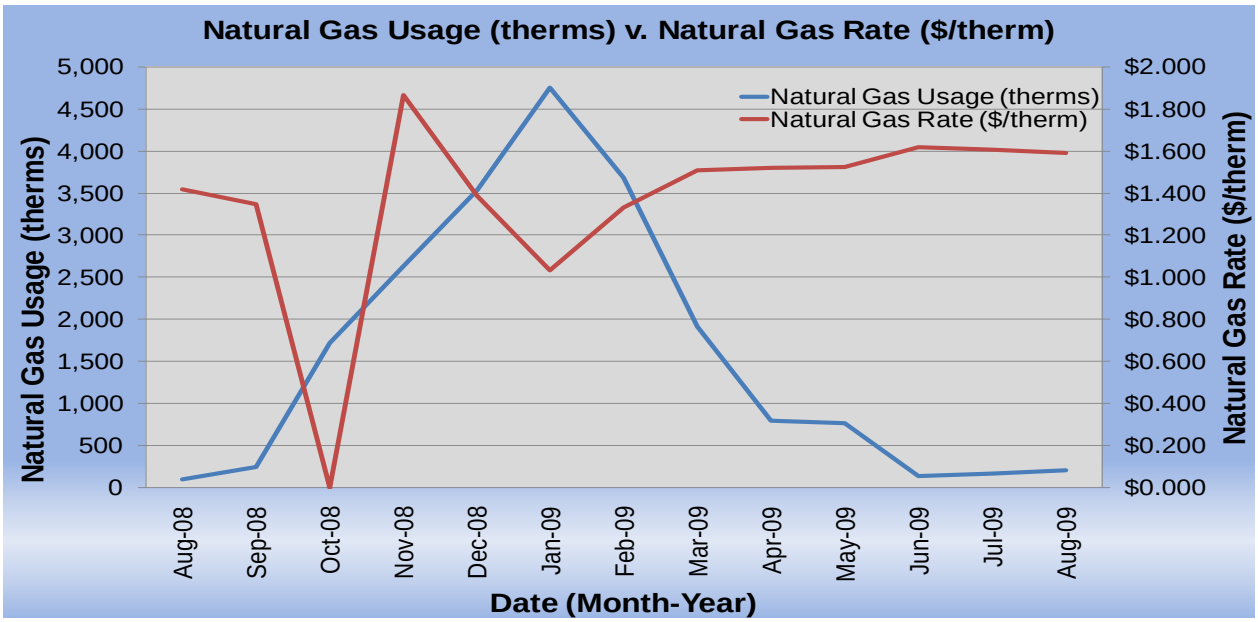




6.2. Tariff analysis

Currently, natural gas is provided to the Mt. Olive Municipal main building via one gas meter with the Elizabethtown Gas Co. acting as the supply and also the transport company. Gas is provided by the Elizabethtown Gas Co. at a general service rate. The suppliers' general service rate for natural gas charges a market-rate price based on use and the Mt. Olive Municipal building billing does not breakdown demand costs for all periods. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the natural gas prices increase during the

heating months when natural gas is used by the hot water boiler units. The high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Thus the building pays for fixed costs such as meter reading charges during the summer months. So October cap payment is excluded from the following chart.

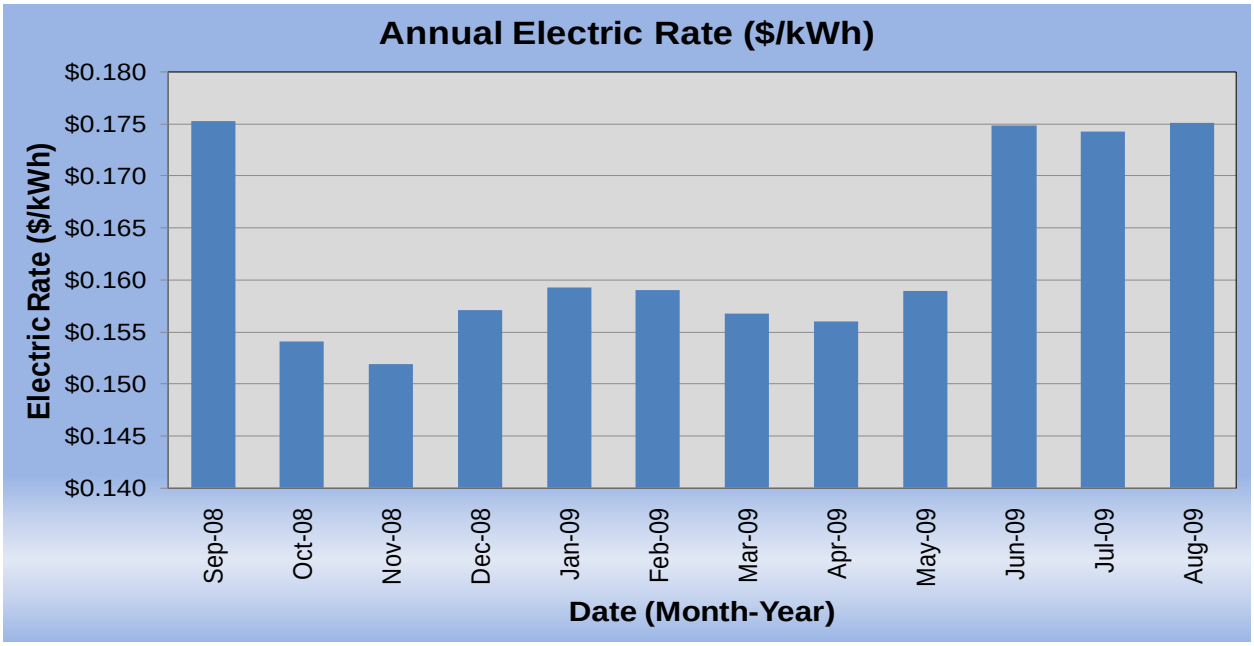


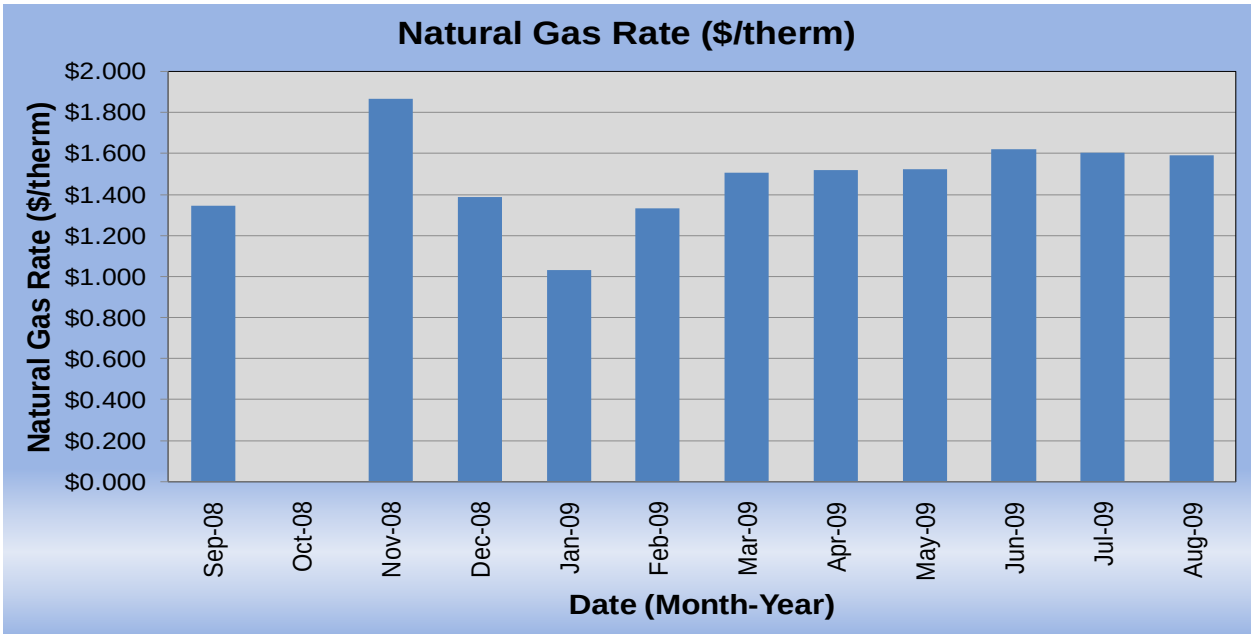
The Mt. Olive Municipal building is direct-metered and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Mt. Olive Municipal building billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by the HVAC condensing units and air handlers.

6.3. Energy Procurement strategies

The Mt. Olive Municipal building receives natural gas via one incoming meter. The Elizabethtown Gas Co. supplies the gas and transports it. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased via one incoming meter directly for the main Mt. Olive Municipal building from JCP&L without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations up to 20% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 45% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and recent escalating energy costs. The average estimated NJ commercial utility rates for electric and gas are $0.150/kWh and $1.550/therm respectively. The Mt. Olive Municipal building annual utility costs are $9,261 higher for electric and $914 lower for natural gas for a total of $8,347 lower, when compared to the average estimated NJ commercial utility rates. SWA recommends that the Township of Mount Olive further explore opportunities of purchasing both natural gas and electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Mt. Olive Municipal building. Appendix B contains a complete list of third party energy suppliers for the Mt. Olive Township service area. The Township of Mount Olive may want to consider partnering with other school districts, municipalities, townships and communities to aggregate

a substantial electric and natural gas use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country and in New Jersey. Also, the Mt. Olive Municipal building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time (without a large capital investment) to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. Demand Response could be an option in the future when the Township of Mount Olive may install a large enough back-up emergency generator. The following charts show the Mt. Olive Municipal building monthly spending per unit of energy in 2009.





7. METHOD OF ANALYSIS

7.1. Assumptions and tools

Energy modeling tool:	established / standard industry assumptions, E-Quest
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Published and established specialized equipment material and labor costs Cost estimates also based on utility bill analysis and prior experience with similar projects

7.2. Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.

Appendix A: Lighting Study

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	GF	Health Dept	Parabolic	E	4'T8	21	3	32	S	9.0	291	10	2,016	5,830	N/A	Parabolic	4'T8	E	S	21	3	32	9.0	291	10	2016	5830	0	0	0
2	GF	Health Dept Director	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
3	GF	Health Dept Office 2	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
4	GF	Health Dept Office 1	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
5	GF	Bathroom	4' U-Shape	E	4'T8	1	2	32	S	9.0	291	8	64	189	N/A	4' U-shape	4'T8	E	S	1	2	32	9.0	291	8	64	189	0	0	0
6	GF	Copy room	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	C	Parabolic	4'T8	E	OS	4	3	32	6.8	291	10	384	833	0	278	278
7	GF	Nurse's Office	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	291	10	384	1110	0	0	0
8	GF	Waiting room	Parabolic	E	4'T8	6	3	32	S	8.0	291	10	576	1,481	N/A	Parabolic	4'T8	E	S	6	3	32	8.0	291	10	576	1481	0	0	0
9	GF	Waiting room	4' U-Shape	E	4'T8	2	2	32	S	8.0	291	8	128	335	N/A	4' U-shape	4'T8	E	S	2	2	32	8.0	291	8	128	335	0	0	0
10	GF	Court Room	Parabolic	E	4'T8	20	3	32	S	9.0	291	10	1,920	5,552	N/A	Parabolic	4'T8	E	S	20	3	32	9.0	291	10	1920	5552	0	0	0
11	GF	Court Room	Exit Sign	N	LED	3	1	5	N	24.0	365	1	15	158	N/A	Exit Sign	LED	N	N	3	1	5	24.0	365	1	15	158	0	0	0
12	GF	Judges Chambers	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
13	GF	Court Admin	Parabolic	E	4'T8	2	3	32	S	8.0	291	10	192	494	N/A	Parabolic	4'T8	E	S	2	3	32	8.0	291	10	192	494	0	0	0
14	GF	Court Storage	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
15	GF	Court Admin / General Office	Parabolic	E	4'T8	11	3	32	S	9.0	291	10	1,056	3,054	N/A	Parabolic	4'T8	E	S	11	3	32	9.0	291	10	1056	3054	0	0	0
16	GF	Court Admin / General Office	4' U-Shape	E	4'T8	3	2	32	S	9.0	291	8	192	566	N/A	4' U-shape	4'T8	E	S	3	2	32	9.0	291	8	192	566	0	0	0
17	GF	Prosecutor Office	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
18	GF	Welfare Office	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
19	GF	Hallway	4' U-Shape	E	4'T8	8	2	32	S	16.0	291	8	512	2,682	C	4' U-shape	4'T8	E	DL	8	2	32	12.0	291	8	512	2011	0	670	670
20	GF	Hallway	Exit Sign	N	LED	2	1	5	N	24.0	365	1	10	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	10	105	0	0	0
21	GF	Janitor's Closet	Parabolic	E	4'T8	1	2	32	S	2.0	291	6	64	41	N/A	Parabolic	4'T8	E	S	1	2	32	2.0	291	6	64	41	0	0	0
22	GF	Mechanical Rm	Screw-in	N	CFL	1	1	23	S	2.0	291	0	23	13	N/A	Screw-in	CFL	N	S	1	1	23	2.0	291	0	23	13	0	0	0
23	GF	Bathroom Men	Parabolic	N	4'T8	2	3	32	OS	9.0	291	10	192	555	N/A	Parabolic	4'T8	N	OS	2	3	32	9.0	291	10	192	555	0	0	0
24	GF	Bathroom Women	Parabolic	N	4'T8	2	3	32	OS	9.0	291	10	192	555	N/A	Parabolic	4'T8	N	OS	2	3	32	9.0	291	10	192	555	0	0	0
25	GF	Hallway	4' U-Shape	E	4'T8	7	2	32	S	16.0	291	8	448	2,347	C	4' U-shape	4'T8	E	DL	7	2	32	12.0	291	8	448	1760	0	587	587
26	GF	Weight room	4' U-Shape	E	4'T8	3	2	32	S	8.0	291	8	192	503	N/A	4' U-shape	4'T8	E	S	3	2	32	8.0	291	8	192	503	0	0	0
27	GF	Weight room	Parabolic	E	4'T8	9	3	32	S	8.0	291	10	864	2,221	N/A	Parabolic	4'T8	E	S	9	3	32	8.0	291	10	864	2221	0	0	0
28	GF	Men's Locker Room	Parabolic	E	4'T8	5	3	32	S	8.0	291	10	480	1,234	C	Parabolic	4'T8	E	OS	5	3	32	6.0	291	10	480	925	0	308	308
29	GF	Men's Locker Room	4' U-Shape	E	4'T8	7	2	32	S	8.0	291	8	448	1,173	C	4' U-shape	4'T8	E	OS	7	2	32	6.0	291	8	448	880	0	293	293
30	GF	Men's Locker Room	Screw-in	N	CFL	3	1	23	S	8.0	291	0	69	161	N/A	Screw-in	CFL	N	S	3	1	23	8.0	291	0	69	161	0	0	0
31	GF	Women's Locker Room	Screw-in	N	CFL	2	1	23	S	8.0	291	0	46	107	N/A	Screw-in	CFL	N	S	2	1	23	8.0	291	0	46	107	0	0	0
32	GF	Women's Locker Room	Parabolic	E	4'T8	2	2	32	S	8.0	291	6	128	326	C	Parabolic	4'T8	E	OS	2	2	32	6.0	291	6	128	244	0	81	81
33	GF	Women's Locker Room	4' U-Shape	E	4'T8	4	2	32	S	8.0	291	8	256	670	C	4' U-shape	4'T8	E	OS	4	2	32	6.0	291	8	256	503	0	168	168
34	GF	Detective Bureau	Parabolic	E	4'T8	8	3	32	S	9.0	291	10	768	2,221	N/A	Parabolic	4'T8	E	S	8	3	32	9.0	291	10	768	2221	0	0	0
35	GF	Lieutenant Detective Bureau	Parabolic	E	4'T8	3	3	32	S	9.0	291	10	288	833	N/A	Parabolic	4'T8	E	S	3	3	32	9.0	291	10	288	833	0	0	0
36	GF	Interview room	Parabolic	E	4'T8	1	3	32	S	9.0	291	10	96	278	N/A	Parabolic	4'T8	E	S	1	3	32	9.0	291	10	96	278	0	0	0
37	GF	Sally Port	Parabolic	E	4'T8	12	2	32	S	16.0	365	6	768	4,906	C	Parabolic	4'T8	E	OS	12	2	32	12.0	365	6	768	3679	0	1226	1226
38	GF	Jail Cells	Parabolic	M	4'T12	1	3	40	S	12.0	365	32	120	666	T8	Parabolic	4'T8	E	S	1	3	32	12.0	365	10	96	464	201	0	201
39	GF	Jail Cells	Parabolic	M	4'T12	1	3	40	S	12.0	365	32	120	666	T8	Parabolic	4'T8	E	S	1	3	32	12.0	365	10	96	464	201	0	201
40	GF	Jail Cells	Parabolic	M	4'T12	2	3	40	S	12.0	365	32	240	1,332	T8	Parabolic	4'T8	E	S	2	3	32	12.0	365	10	192	929	403	0	403
41	GF	Bathroom	4' U-Shape	E	4'T8	1	2	32	S	9.0	291	8	64	189	N/A	4' U-shape	4'T8	E	S	1	2	32	9.0	291	8	64	189	0	0	0
42	GF	Processing	Parabolic	E	4'T8	5	3	32	S	8.0	291	10	480	1,234	N/A	Parabolic	4'T8	E	S	5	3	32	8.0	291	10	480	1234	0	0	0
43	GF	Patrol Lietenant	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
44	GF	Patrol Sargeant	Parabolic	E	4'T8	1	3	32	S	9.0	291	10	96	278	N/A	Parabolic	4'T8	E	S	1	3	32	9.0	291	10	96	278	0	0	0
45	GF	Patrol Room	Parabolic	E	4'T8	6	3	32	S	24.0	365	10	576	5,571	N/A	Parabolic	4'T8	E	S	6	3	32	24.0	365	10	576	5571	0	0	0
46	GF	Kitchen	Parabolic	E	4'T8	1	3	32	S	9.0	365	10	96	348	N/A	Parabolic	4'T8	E	S	1	3	32	9.0	365	10	96	348	0	0	0
47	GF	Interview Room	Parabolic	E	4'T8	1	3	32	S	5.0	291	10	96	154	N/A	Parabolic	4'T8	E	S	1	3	32	5.0	291	10	96	154	0	0	0
48	GF	Interview Room	Parabolic	E	4'T8	1	3	32	S	5.0	291	10	96	154	N/A	Parabolic	4'T8	E	S	1	3	32	5.0	291	10	96	154	0	0	0
49	GF	Training Room	Parabolic	E	4'T8	6	3	32	S	9.0	291	10	576	1,666	N/A	Parabolic	4'T8	E	S	6	3	32	9.0	291	10	576	1666	0	0	0
50	GF	Conference Room	Parabolic	E	4'T8	6	3	32	S	9.0	291	10	576	1,666	N/A	Parabolic	4'T8	E	S	6	3	32	9.0	291	10	576	1666	0	0	0

Location			Existing Fixture Information													Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
51	GF	Armory	Parabolic	E	4'T8	3	3	32	S	9.0	291	10	288	833	C	Parabolic	4'T8	E	OS	3	3	32	6.8	291	10	288	625	0	208	208
52	GF	Lietenant Support Services	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
53	GF	Police Captain	Parabolic	E	4'T8	2	3	32	S	8.0	291	10	192	494	N/A	Parabolic	4'T8	E	S	2	3	32	8.0	291	10	192	494	0	0	0
54	GF	Support Services	Parabolic	E	4'T8	6	3	32	S	8.0	291	10	576	1,481	N/A	Parabolic	4'T8	E	S	6	3	32	8.0	291	10	576	1481	0	0	0
55	GF	Clerical / Admin Area	Parabolic	E	4'T8	5	3	32	S	9.0	291	10	480	1,388	N/A	Parabolic	4'T8	E	S	5	3	32	9.0	291	10	480	1388	0	0	0
56	GF	Evidence room	Parabolic	E	4'T8	3	2	32	S	2.0	291	6	192	122	N/A	Parabolic	4'T8	E	S	3	2	32	2.0	291	6	192	122	0	0	0
57	GF	Records room	Parabolic	E	4'T8	4	3	32	S	2.0	291	10	384	247	N/A	Parabolic	4'T8	E	S	4	3	32	2.0	291	10	384	247	0	0	0
58	GF	Mechanical Rm	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
59	GF	Dispatch Room	Parabolic	E	4'T8	4	3	32	S	9.0	365	10	384	1,393	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	365	10	384	1393	0	0	0
60	GF	Hallw ay	4' U-Shape	E	4'T8	13	2	32	S	16.0	291	8	832	4,358	N/A	4' U-shape	4'T8	E	S	13	2	32	16.0	291	8	832	4358	0	0	0
61	GF	Hallw ay	Exit Sign	N	LED	2	1	5	N	24.0	365	1	10	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	10	105	0	0	0
62	GF	Hallw ay	Exit Sign	N	LED	4	1	5	N	24.0	365	1	20	210	N/A	Exit Sign	LED	N	N	4	1	5	24.0	365	1	20	210	0	0	0
63	GF	Hallw ay	4' U-Shape	E	4'T8	9	2	32	S	16.0	291	8	576	3,017	N/A	4' U-shape	4'T8	E	S	9	2	32	16.0	291	8	576	3017	0	0	0
64	GF	Vestibule	Screw -in	N	MH	3	1	50	S	16.0	291	13	150	880	PSMH	Screw -in	PSMH	N	DL	3	1	35	12.0	291	8	105	450	279	150	430
65	GF	Lobby	4' U-Shape	E	4'T8	3	1	32	S	8.0	291	4	96	251	C	4' U-shape	4'T8	E	DL	3	1	32	4.0	291	4	96	126	0	126	126
66	GF	Mechanical Rm	Parabolic	E	4'T8	11	2	32	S	9.0	291	6	704	2,017	C	Parabolic	4'T8	E	OS	11	2	32	6.8	291	6	704	1512	0	504	504
67	GF	Storage Rm	4' U-Shape	E	4'T8	1	2	32	S	2.0	291	8	64	42	N/A	4' U-shape	4'T8	E	S	1	2	32	2.0	291	8	64	42	0	0	0
68	GF	Corridor	4' U-Shape	E	4'T8	2	2	32	S	9.0	291	8	128	377	N/A	4' U-shape	4'T8	E	S	2	2	32	9.0	291	8	128	377	0	0	0
69	GF	Mayor's Office	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	291	10	384	1110	0	0	0
70	GF	Business Administrator	Parabolic	E	4'T8	4	3	32	S	8.0	291	10	384	987	N/A	Parabolic	4'T8	E	S	4	3	32	8.0	291	10	384	987	0	0	0
71	GF	General Office Area	Parabolic	E	4'T8	8	3	32	S	9.0	291	10	768	2,221	N/A	Parabolic	4'T8	E	S	8	3	32	9.0	291	10	768	2221	0	0	0
72	GF	Conference room	Parabolic	E	4'T8	4	3	32	S	2.0	291	10	384	247	N/A	Parabolic	4'T8	E	S	4	3	32	2.0	291	10	384	247	0	0	0
73	GF	Assistant Admin	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
74	GF	AV training	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
75	GF	Storage Rm	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
76	GF	General Office area	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	291	10	384	1110	0	0	0
77	GF	Tow nship Clerk office	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
78	GF	Vault	Parabolic	E	4'T8	2	3	32	S	16.0	291	10	192	987	N/A	Parabolic	4'T8	E	S	2	3	32	16.0	291	10	192	987	0	0	0
79	GF	Storage Rm	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
80	GF	Kitchen / Cafeteria	Parabolic	E	4'T8	13	3	32	S	9.0	291	10	1,248	3,609	C	Parabolic	4'T8	E	OS	13	3	32	6.8	291	10	1248	2707	0	902	902
81	GF	Mail room	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
82	GF	Council Chambers	Parabolic	E	4'T8	20	4	32	S	8.0	291	13	2,560	6,565	N/A	Parabolic	4'T8	E	S	20	4	32	8.0	291	13	2560	6565	0	0	0
83	GF	Council Chambers	Screw -in	E	MH	5	1	70	S	2.0	291	18	350	256	PSMH	Screw -in	PSMH	E	S	5	1	45	2.0	291	10	225	160	96	0	96
84	GF	Council Chambers	Exit Sign	N	LED	2	1	5	N	24.0	365	1	10	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	10	105	0	0	0
85	GF	Bathroom Men	Parabolic	E	4'T8	2	3	32	OS	8.0	291	10	192	494	N/A	Parabolic	4'T8	E	OS	2	3	32	8.0	291	10	192	494	0	0	0
86	GF	Bathroom Women	Parabolic	E	4'T8	2	3	32	OS	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	OS	2	3	32	9.0	291	10	192	555	0	0	0
87	GF	CFO Office	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	291	10	384	1110	0	0	0
88	GF	Assistant Treasurer	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
89	GF	Collector	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
90	GF	Secure File Room	Parabolic	E	4'T8	2	3	32	S	2.0	291	10	192	123	N/A	Parabolic	4'T8	E	S	2	3	32	2.0	291	10	192	123	0	0	0
91	GF	Assessor	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
92	GF	General Office Area	Parabolic	E	4'T8	26	3	32	S	9.0	291	10	2,496	7,218	N/A	Parabolic	4'T8	E	S	26	3	32	9.0	291	10	2496	7218	0	0	0
93	GF	General Office Area	Exit Sign	N	LED	3	1	5	N	24.0	365	1	15	158	N/A	Exit Sign	LED	N	N	3	1	5	24.0	365	1	15	158	0	0	0
94	GF	General Office Area	Parabolic	E	4'T8	19	3	32	S	9.0	291	10	1,824	5,275	N/A	Parabolic	4'T8	E	S	19	3	32	9.0	291	10	1824	5275	0	0	0
95	GF	Recreation buildings & ground	Parabolic	E	4'T8	4	3	32	S	9.0	291	10	384	1,110	N/A	Parabolic	4'T8	E	S	4	3	32	9.0	291	10	384	1110	0	0	0
96	GF	Conference room	Parabolic	E	4'T8	5	3	32	S	3.0	291	10	480	463	N/A	Parabolic	4'T8	E	S	5	3	32	3.0	291	10	480	463	0	0	0
97	GF	Planner	Parabolic	E	4'T8	4	3	32	S	8.0	291	10	384	987	N/A	Parabolic	4'T8	E	S	4	3	32	8.0	291	10	384	987	0	0	0
98	GF	Engineer	Parabolic	E	4'T8	3	3	32	S	9.0	291	10	288	833	N/A	Parabolic	4'T8	E	S	3	3	32	9.0	291	10	288	833	0	0	0
99	GF	Engineer	4' U-Shape	E	4'T8	3	2	32	S	9.0	291	8	192	566	N/A	4' U-shape	4'T8	E	S	3	2	32	9.0	291	8	192	566	0	0	0
100	GF	Office	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
101	GF	Water / Sewer Dept	Parabolic	E	4'T8	2	3	32	S	8.0	291	10	192	494	N/A	Parabolic	4'T8	E	S	2	3	32	8.0	291	10	192	494	0	0	0
102	GF	Print / Storage room	Parabolic	E	4'T8	6	3	32	S	9.0	291	10	576	1,666	C	Parabolic	4'T8	E	OS	6	3	32	6.8	291	10	576	1249	0	416	416
103	GF	Print / Copy room	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	C	Parabolic	4'T8	E	OS	2	3	32	6.8	291	10	192	416	0	139	139
104	GF	Bathroom Men	Parabolic	E	4'T8	2	3	32	OS	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	OS	2	3	32	9.0	291	10	192	555	0	0	0
105	GF	Bathroom Women	Parabolic	E	4'T8	2	3	32	OS	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	OS	2	3	32	9.0	291	10	192	555	0	0	0
106	GF	Mechanical Rm	Parabolic	E	4'T8	1	3	32	S	2.0	291	10	96	62	N/A	Parabolic	4'T8	E	S	1	3	32	2.0	291	10	96	62	0	0	0
107	GF	General Office Area	Parabolic	E	4'T8	21	3	32	S	9.0	291	10	2,016	5,830	N/A	Parabolic	4'T8	E	S	21	3	32	9.0	291	10	2016	5830	0	0	0
108	GF	General Office Area	4' U-Shape	E	4'T8	1	2	32	S	9.0	291	8	64	189	N/A	4' U-shape	4'T8	E	S	1	2	32	9.0	291	8	64	189	0	0	0
109	GF	Building Inspection Office	Parabolic	E	4'T8	2	3	32	S	9.0	291	10	192	555	N/A	Parabolic	4'T8	E	S	2	3	32	9.0	291	10	192	555	0	0	0
110	GF	Hallway	4' U-Shape	E	4'T8	7	2	32	S	16.0	291	8	448	2,347	C	4' U-shape	4'T8	E	DL	7	2	32	12.0	291	8	448	1760	0	587	587
111	GF	Hallway	4' U-Shape	E	4'T8	7	2	32	S	16.0	291	8	448	2,347	C	4' U-shape	4'T8	E	DL	7	2	32	12.0	291	8	448	1760	0	587	587
112	GF	Hallway	4' U-Shape	E	4'T8	8	2	32	S	16.0	291	8	512	2,682	C	4' U-shape	4'T8	E	DL	8	2	32	12.0	291	8	512	2011	0	670	670
113	GF	Hallway	Exit Sign	N	LED	2	1	5	N	24.0	365	1	10	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	10	105	0	0	0
114	GF	Hallway	Exit Sign	N	LED	2	1	5	N	24.0	365	1	10	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	10	105	0	0	0
115	GF	Hallway	Exit Sign	N	LED	1	1	5	N	24.0	365	1	5	53	N/A	Exit Sign	LED	N	N	1	1	5	24.0	365	1	5	53	0	0	0
116	Ext	Exterior	Screw-in	N	MH	5	1	50	PC	12.0	365	13	250	1,380	PSMH	Screw-in	PSMH	N	PC	5	1	35	12.0	365	8	175	942	438	0	438
117	Ext	Exterior Parking	Screw-in	N	MH	16	1	250	PC	12.0	365	63	4,000	21,935	PSMH	Screw-in	PSMH	N	PC	16	1	175	12.0	365	38	2800	14927	7008	0	7008
118	Ext	Exterior Uplighting	Screw-in	N	MH	2	1	50	PC	12.0	365	13	100	552	PSMH	Screw-in	PSMH	N	PC	2	1	35	12.0	365	8	70	377	175	0	175
119	Ext	Exterior Wall packs	Screw-in	N	MH	2	1	50	PC	12.0	365	13	100	552	PSMH	Screw-in	PSMH	N	PC	2	1	35	12.0	365	8	70	377	175	0	175
Totals:						**540**	**297**	**3,858**					**48,105**	**159,497**						**540**	**297**	**3,706**				**46,504**	**142,618**	**8,978**	**7,902**	**16,879**
Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space																													

Proposed Lighting Summary Table			
Total Surface Area (SF)	35,000		
Average Power Cost ($/kWh)	0.164		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	24,419	16,622	**7,796**
Exterior Power (watts)	4,450	3,115	**1,335**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	135,078	125,995	**9,083**
Lighting Power (watts)	43,655	43,389	**266**
Lighting Power Density (watts/SF)	1.25	1.24	**0**
Estimated Cost of Fixture Replacement ($)	14,745		
Estimated Cost of Controls Improvements ($)	4,680		
Total Consumption Annual Cost Savings ($)	**2,915**		

Legend:

Fixture Type	Lamp Type	Control Type	Ballast Type	Retrofit Category
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Installl new T8)
Pin	1'T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2'T5	T (Timer)		CFL (Install new CFL)
Recessed	3'T5	PC (Photocell)		LEDex (Install new LED Exit)
2'U-shape	4'T5	D (Dimming)		LED (Install new LED)
Circiline	2'T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3'T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4'T8			
	6'T8			
	8'T8			
	2'T12			
	3'T12			
	4'T12			
	6'T12			
	8'T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium			
	LPS (Low Pressure Sodium)			

Appendix B: Third Party Energy Suppliers (ESCOs)
http://www.state.nj.us/bpu/commercial/shopping.html

JCP&L ELECTRICAL SERVICE TERRITORY Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com	**BOC Energy Services, Inc.** 1135 Mountain Avenue Murray Hill, NJ 011374 (800) 247-2644 www.boc.com	**Commerce Energy, Inc.** 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-84113 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com	**Direct Energy Services, LLC** 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com	**FirstEnergy Solutions Corp.** 300 Madison Avenue Morristown, NJ 0113113 (800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640 (877) 569-2841 www.glacialenergy.com	**Integrys Energy Services, Inc.** 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integrysenergy.com	**Strategic Energy, LLC** 55 Madison Avenue, Suite 400 Morristown, NJ 011360 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-31139 www.libertypowercorp.com	**Pepco Energy Services, Inc.** 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (363-7499) www.pepco-services.com	**PPL EnergyPlus, LLC** 811 Church Road Cherry Hill, NJ 08002 (800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095 (877) 273-6772 www.semprasolutions.com	**South Jersey Energy Company** One South Jersey Plaza Route 54 Folsom, NJ 08037 (800) 800-756-3749 www.south jerseyenergy.com	**Suez Energy Resources NA, Inc.** 333 Thornall Street 6th Floor Edison, NJ 08837 (888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 080113 (856) 273-9995 www.ugienergyservices.com	**American Powernet Management, LP** 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com	**ConEdison Solutions** Cherry Tree, Corporate Center 1135 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450 212-1138-3124 www.creditsuisse.com	**Sprague Energy Corp.** 12 Ridge Road Chatham Township NJ 011328 (800) 225-1560 www.spragueenergy.com	

ELIZABETHTOWN GAS COMPANY NATURAL GAS SERVICE TERRITORY Last Updated: 06/15/09		
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6BUYGAS (6-289427) www.cooperativenet.com	**Direct Energy Services, LLP** 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com	**Glacial Energy of New Jersey, Inc.** 207 LaRoche Avenue Harrington Park, NJ 07640 1-877-569-2841 www.glacialenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com	**UGI Energy Services, Inc. d/b/a GASMARK** 704 East Main Street, Suite 1 Moorestown, NJ 08057 856-273-9995 www.ugienergyservices.com	**Great Eastern Energy** 116 Village Riva, Suite 200 Princeton, NJ 08540 888-651-4121 www.greateastern.com
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com	**Metromedia Energy, Inc.** 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com	**Intelligent Energy** 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327 800-375-1277 www.mxenergy.com	**NATGASCO (Mitchell Supreme)** 532 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com	**Metro Energy Group, LLC** 14 Washington Place Hackensack, NJ 07601 888-53-Metro www.metroenergy.com
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com	**Stuyvesant Energy LLC** 10 West Ivy Lane, Suite 4 Englewood, NJ 07631 800-646-6457 www.stuyfuel.com	**Pepco Energy Services, Inc.** 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928 800-225-1560 www.spragueenergy.com	**South Jersey Energy Company** One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm	**Woodruff Energy** 73 Water Street Bridgeton, NJ 08302 800-557-1121 www.woodruffenergy.com