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July 17, 2009

Local Government Energy Program
Energy audit report

For

Hamilton Board of Education
Mercerville Elementary School
Hamilton, NJ 08619

Project Number: LGEA01

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INTRODUCTION

On April 13th, 14th, 15th and 16th, 2009, Steven Winter Associates, Inc. (SWA) performed energy audits and assessments of 12 elementary schools within the Hamilton School District located in Hamilton, NJ. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The following twelve elementary schools were evaluated under this energy audit: Greenwood, Klockner, Kuser, Lalor, Langtree, Mercerville, Morgan, Robinson, Sayen, Sunnybrae, Yardville, and Yardville Heights. The original construction date, type, and building area of each school vary, since the buildings were constructed to accommodate school district expansion over the years. Construction of the original 12 buildings was undertaken between 1908 and 1966, with additions or modular classroom units added between 1922 and 1995. Floor area ranges from 27,750 square feet up to 51,813 square feet. Typical occupancy includes 300 Kindergarten through fifth grade students and 30 teachers and staff.

Energy data and building information collected in the field were analyzed to determine the baseline energy performance of each building. Using spreadsheet-based calculation methods, SWA estimated the energy and cost savings associated with the installation of each of the recommended energy conservation measures. The findings for each building are summarized in the respective report.

The present report is for Mercerville Elementary School only.

Mercerville Elementary School was built in 1911 with additions built in 1928, 1931, 1948, 1952, and 1995. The school consists of 45,098 square feet of conditioned space. There are approximately 300 students in grades Kindergarten through fifth grade and about 59 staff people. The building is operated on weekday schedule from 6:30 am to 5:30 pm, about 55 hours a week.

The goal of this energy audit is to provide sufficient information to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

EXECUTIVE SUMMARY

This document contains the energy audit report for Mercerville Elementary School located at 60 Regina Ave, Hamilton, NJ 08619. Mercerville Elementary is a two story building. Based on the field visit performed by Steven Winter Associates (SWA) staff on April 13th, 2009 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.

In the most recent year of full data collected (September 2007 through September 2008), Mercerville Elementary School building consumed approximately 170,320 kwh or $25,439 worth of electricity and 28,877 therms or $44,759 worth of natural gas. For purposes of this report, an average gas cost of $1.55/therm was assumed. This unit price represents typical local costs for both consumption and transportation of natural gas. With electricity and gas combined, the building consumed 3,469 MMBtu of energy at a total cost of $70,197.

SWA benchmarked Mercerville Elementary School using the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The Portfolio Manager generated a benchmark score of 54 for the building, when compared to a national average. The benchmark rating is based on the facility's source energy use, level of business activity, and geographical location. The Portfolio Manager is also capable of generating a site energy use intensity number using 2008 as a baseline year.

In order to compare commercial buildings equitably, the *Portfolio Manager* ratings convey the consumption of each type of energy in a single common unit. The EPA uses source energy to represent the total amount of raw fuel required to operate the building. The site energy use intensity for Mercerville Elementary School building is 74 kBtu/sq.ft/year. After energy efficiency improvements are made, future utility bills can be added to the Portfolio Manager and the site energy use intensity for a different time period can be compared to September 2007 through September 2008 baseline to track the changes in energy consumption associated with energy improvements.

SWA recommends a total of 1 Energy Conservation Measure (ECM) for Mercerville Elementary School. The total investment cost for these ECMs is **$9,615**. SWA estimates a first year savings of **$2,256** with a simple payback of **4.3 years**. SWA also estimates that Mercerville Elementary School will be able to reduce their carbon footprint by **26,061 lbs of CO2 annually.**

There are various incentives that Mercerville Elementary School could apply for that could also help lower the cost of installing the ECMs. SWA recommends that Mercerville Elementary School applies for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project.

When pursuing incentives through the SmartStart program, SWA encourages building managers to contact the program provider to obtain more detailed information on the program guidelines and request pre-approval for all planned upgrades. At the time of this report, high-efficiency, gas-fired boilers with a capacity between 1500 – 4000 MBH may be eligible for an incentive of $1.00 per MBH. Larger equipment may qualify for a custom incentive package. When replacing gas-fired water heaters, consider upgrading to high-efficiency equipment. Water heaters that are 50 gallons and larger may be eligible for an incentive of $1.00-$2.00 per MBH. Incentives are also available for the installation of occupancy sensors and dimming controls. Incentives for lighting controls vary and are based on the quantity and type of controls installed.

For further information on both custom and prescriptive incentives, please visit:

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/equipment-incentives/equi

The New Jersey Clean Energy website also provides information on incentives for renewable energy. Visit the website to download a copy of the Renewable Energy Incentive Program (REIP) Guidebook. Incentives include up to $1.00 per watt for eligible photovoltaic projects.

Hamilton Board of Education should become familiar with New Jersey Clean Energy programs aimed specifically at schools if they are considering building new facilities or doing major renovations. For further information about specific program information, please visit:
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/school-construction/about

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economical relevance.

SCOPE OF WORK – SUMMARY TABLE

ECM Table without Incentives

		Installed Cost		1st year energy savings									Lifetime		
ECM#	ECM description	Estimated $	Source	Electric Savings (kWh)	Unit	Natural Gas Savings (therms)	Unit	Demand	Unit	$ Savings/year	SPP	LoM	Cost Savings	ROI	Annual Carbon Reduction (lbs of CO2)
1	Upgrade existing lighting	$ 9,615	RSMeans	14,555	kWh	-	therms	1.7	kW	$ 2,256	4.3	20	$ 45,121	18.5%	26,061
Total	**Total Scope of Work**	**$ 9,615**	**-**	**14,555**	**-**	**0**		**1.7**	**-**	**$ 2,256**	**4.3**		**$ 45,121**		**26,061**

Definitions:

SPP: Simple Payback (years)
LoM: Life of Measure (years)
ROI: Return on Investment (%)

Assumptions:

Discount rate:	3.2%	per DOE FEMP guidelines	Average Electric Rate =	0.155	$/kWh	Carbon Dioxide per unit Electriciy =	1.7905	lbs of CO2/kWh
Energy price escalation rate:	0%	per DOE FEMP guidelines	Average Natural Gas Rate =	1.55	$/therm	Carbon Dioxide per unit Nat.l Gas =	11.023	lbs of CO2/therm

1. HISTORIC ENERGY CONSUMPTION

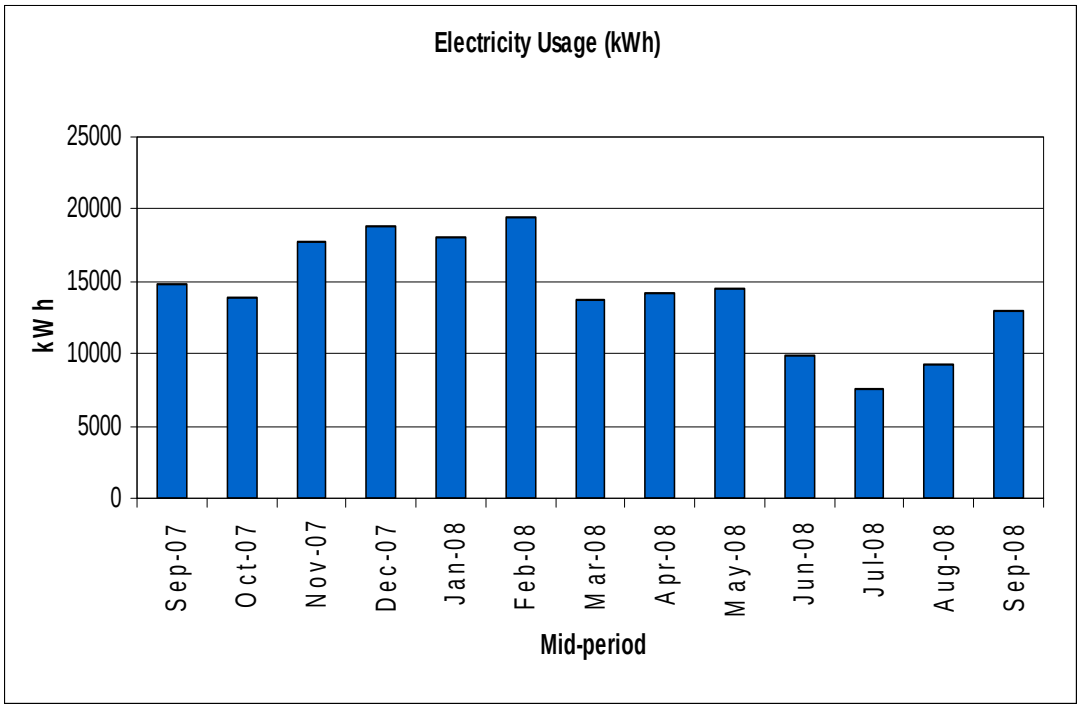
1.1. Energy usage and cost analysis

SWA received and analyzed utility bills from September 2006 through September 2008 that were received from the Hamilton Board of Education.

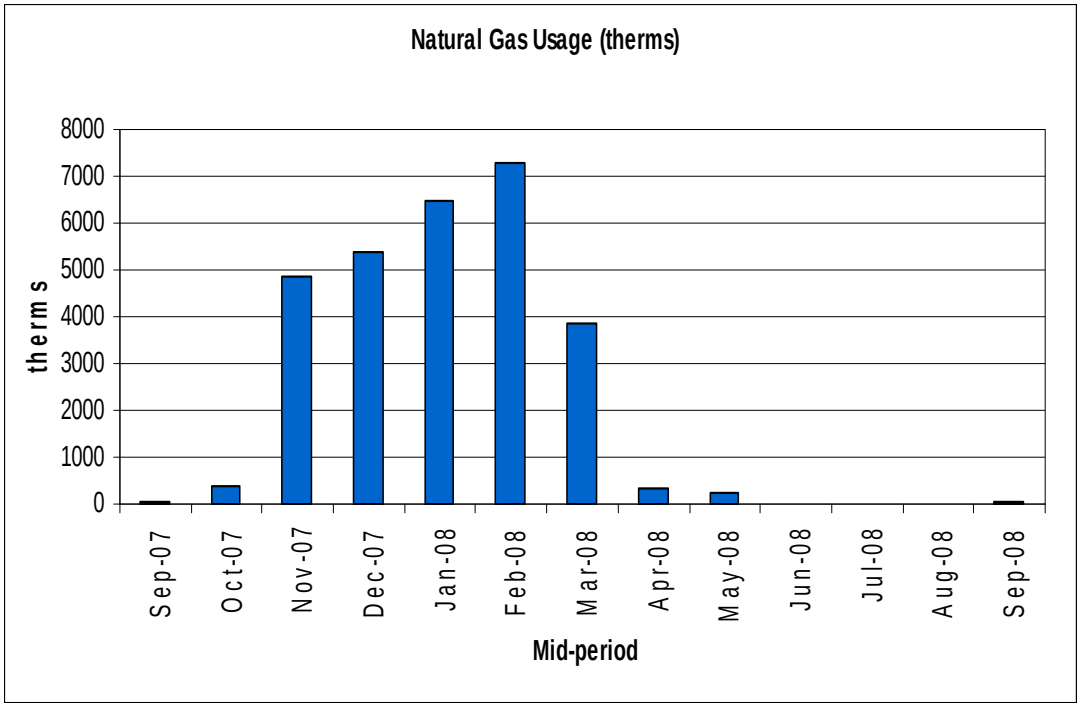
Electricity – Mercerville Elementary School has one electric meter for incoming electricity supply. The building purchases electricity from PSE&G at **an average aggregated rate of $.158/kWh** based on September 2007 through September 2008 electric bills. The building purchased **approximately 170,320 kWh or $25,439 worth of electricity based on the specified 12 months of utility bills.** Based on the same time period, the building also has **an average monthly demand of 52.7 kW and monthly peak demand of 59.2 kW.**

Natural Gas – Mercerville Elementary School has one gas meter for incoming natural gas from PSE&G. Between September 2007 and September 2008, the building purchased **approximately 28,877 therms or $44,759 worth of natural gas.** To account for the additional costs associated with transportation and delivery fees, an average total gas rate of $1.55 per therm was assumed in this report.

The following chart shows electricity usage for the Mercerville Elementary School based on utility bills for the year 2008.



The following chart shows the natural gas usage for Mercerville Elementary School base on utility bills for the year September 2007 to September 2008.



In the above chart, the natural gas usage follows a heating trend as expected. During the summer it is clear that the natural gas usage is very minimal which reflects that heat is not being used and the DHW load is minimal.

1.2. Utility rate

Mercerville Elementary School currently buys electricity and gas from PSE&G at the FTLV general service rate (or MD rate). The FTLV general service is a typical rate where customers pay for natural gas based on usage and electricity based on usage with the addition of an electrical charge demand. Mercerville Elementary School uses account #62 161 093 59, at the service address of 60 Regina Ave, Hamilton, NJ 08619 for the building electric and gas. Electricity for the building was billed at an average rate of **$0.158/kWh**. As previously noted, a typical regional average gas unit price of **$1.55/therm** was assumed in this report to address both the consumption and transportation costs of the fuel.

1.3. Energy benchmarking

Mercerville Elementary School information and utility data were entered into the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. The performance score generated for the building is 54. SWA recommends that the Mercerville Elementary School Board of Education maintain the Portfolio Manager account at the link below. As the account is maintained, SWA can share the Mercerville Elementary School facility and allow future data to be added and tracked using the benchmarking tool.

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Mercerville Elementary

Building ID: 1759980
For 12-month Period Ending: September 30, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 26, 2009

Facility
Mercerville Elementary
60 Regina Ave
Trenton, NJ 08619

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1911
Gross Floor Area (ft²): 45,098

Energy Performance Rating[2] (1-100) 54

Site Energy Use Summary[3]

Natural Gas (kBtu)[4]	2,737,651
Electricity (kBtu)	584,164
Total Energy (kBtu)	3,321,815

Energy Intensity[5]

Site (kBtu/ft²/yr)	74
Source (kBtu/ft²/yr)	107

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	235

Electric Distribution Utility
PSE&G - Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	76
National Average Source EUI	111
% Difference from National Average Source EUI	-4%
Building Type	K-12 School

Stamp of Certifying Professional

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

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 Mercerville Elementary School, located at 60 Regina Avenue in Hamilton, New Jersey was built in 1911 and was originally approximately 8,523 square feet consisting of two stories above ground and a basement. Sections were added as follows: 1,476 SF in 1928, 738 SF in 1931, 22,560 SF in 1948, 9,290 SF in 1952 and 2,511 SF in 1995. The building today is comprised of 45,098 square feet of conditioned space that includes approximately 19 classrooms, a pre-school room, three offices, a music room, several remedial reading and other support rooms, a faculty break room, a library, a music room, a cafeteria with adjacent kitchen, a large multi-purpose room that also serves as a theater, and various storage areas and rest rooms. The building is built of concrete masonry units and brick. The exterior is a medium shade red brick that is attractive, well pointed and generally well maintained.

2.2. Building occupancy profiles

Mercerville is one of seventeen elementary schools in the Hamilton Township School District. It provides kindergarten through fifth grade education. There is a student enrollment of approximately 393, with a staff of approximately 60 full and part time faculty and employees including teachers, administrative, maintenance, educational assistants and lunchroom/playground assistants. According to maintenance staff the building is occupied for approximately 10 hours each weekday from September through June.

2.3. Building envelope

2.3.1. Exterior walls

The exterior walls of the building consist of concrete masonry unit structure with a light red face brick exterior facade. There is no evidence of any insulation in the exterior walls and maintenance staff could not recall ever seeing any wall insulation. The small section that was added in 1995 would have been required by the state building code to have a certain level of insulation in exterior surfaces.

While insulation could be added to the exterior walls of the building, SWA has determined that it is not cost effective to do so at this time. SWA recommends that if any portion of the building is rehabbed or improved as part of a capital improvement plan, to add extra insulation to keep the building thermally protected whenever possible.

Brick exterior

2.3.2. Roof

The roof of Mercerville School is low pitched throughout. It is covered with asphalt composition shingles and appears to be in good condition. The maintenance staff indicated that there is no roof or ceiling insulation. The small 1995 addition would have been required to have insulation in the roof/ceiling. When future roof replacement is required, the insulation level should be reviewed and increased to provide additional energy savings.

2.3.3. Base

The Mercerville School's base is a five-inch concrete slab-on-grade. There were no reported problems with water penetration or moisture. There is no evidence of any perimeter insulation around the slab or under the slab. Excavation to install additional slab insulation is expensive and would not be cost-effective as a single measure. However, if the perimeter of the building is ever excavated to repair or replace drainage protections, installing two inches of a rigid foam board insulation should be considered.

2.3.4. Windows

The windows at the Mercerville School are a somewhat mixed lot. Some of the windows are aluminum frame with dual glazing and appear to be relatively recent installations. There are, however, many very old steel frame single pane windows that are in poor condition. Not only do single pane windows provide limited resistance to heat loss through the glass, the steel frames are a thermal bridge, meaning a heat conductive material that has one surface on the exterior and one surface on the interior with no thermal isolation as is found on the frames of modern windows. The steel frames also warp easily and make any kind of tight seal between the window sash and the frame virtually impossible.

Installing new windows is one of the most expensive building renovations and the savings derived from the replacement would not justify such expense. SWA recommends that both types of window installations be carefully inspected regularly and any loose or deteriorated weather-stripping be replaced and the perimeter of the exterior sides of both window frames be completely caulked and sealed.

Old Steel Frame Single Pane Windows

Newer Double Pane windows

2.3.5. Exterior doors

The exterior doors of the building are in satisfactory condition for the most part. They are metal clad, insulated doors many of which have a small wire glass insert. Exterior doors can be a major source of heat loss in general and SWA recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. Tight seals around the door will help ensure that the building is kept sealed and insulated over time. This will help ensure that the building stays tight and will prevent unconditioned air from infiltrating the interior.

2.3.6. Building air tightness

The upper floors of the building seemed to be relatively well-sealed considering the age of some of the windows. In the ground level/basement, however, there are numerous air conditioners and louvered vents and at least one window that seemed to be stuck in the open position. These through-the- wall penetrations are leaving the lower level completely open to infiltration of cold outside air in the winter and hot air in the late spring and early fall. These direct pathways to the outside should be sealed. During the winter months the window air conditioners should be covered with some kind of impermeable material that can be taped to the adjacent window frame or wall.

The louvered vents that are not needed for combustion air for the boiler or for exhaust from the kitchen should be removed and the opening completely sealed. The vents that are needed for combustion air in the boiler room should be replaced with an operable louver that opens only when the boiler is in operation and automatically closes when the burners are not firing.

Various wall penetrations

Unsealed window air conditioning units

Any holes or penetrations in the building should be sealed to prevent the loss of conditioned air. All plumbing, wiring, HVAC or ductwork penetrations should be sealed with foam or caulk. All other building penetrations, including fans, air conditioners, pipe, wire, or HVAC penetrations throughout the building should be sealed. Any asbestos-like-material should be removed from the premises before energy efficient upgrades are conducted, such as air sealing or adding insulation.

2.4. HVAC systems

2.4.1. Heating

The school is served by two steam boilers that were recently replaced. These boilers supply steam to floor mounted unit ventilators in each classroom. The heating capacity of each unit ventilators ranges from 60-100 Mbtu. Each unit ventilator has unit-mounted controls that provide adjustment of both the steam valve and the fan. The building is served by pneumatic controls. Boiler On/Off operation can be controlled remotely by an Automated Logic panel located in the mechanical room. See the Equipment Inventory Table for further details.

Asbestos was observed on the piping and equipment in the mechanical room. Although this assessment focuses on energy-efficiency, the health and safety concerns associated with asbestos should be noted. Asbestos abatement is primarily a safety issue and is not directly associated with a cost payback. However, the existence of asbestos very often impacts the ability of building operators to perform routine maintenance procedures without undertaking appropriate safety measures and incurring associated costs.

As a result of asbestos, the efficiency of building systems often suffers from lack of routine maintenance. During the course of this assessment, appropriate safety precautions were taken with regards to the presence of asbestos. In some cases, this prevented SWA from completing a more thorough investigation of the existing systems and equipment. To protect the welfare of students and staff, SWA recommends that asbestos abatement be addressed prior to undertaking any other significant investments in capital improvements.

2.4.2. Cooling

There are also window air conditioner units serving spaces throughout the buildings. SWA recommends replacing older model units with Energy Star window air conditioners, sized proportionally for the room, with an EER of 12 or better. All window air conditioners should have a gasketed cover. SWA recommends a gasketed air conditioner cover called Chill Stop-R if it is not possible to remove fans or air conditioners when not in use during heating months.

2.4.3. Ventilation

The floor-mounted unit ventilators in each classroom have an outdoor air duct through the exterior wall that delivers air to the rear of the unit. Exterior louvers allow air to be drawn into the unit ventilator and heated within the space. When the unit ventilator fan is operating, the fresh air is distributed to the room. In addition, the classrooms have operable windows to provide ventilation during the summer months.

Dedicated exhaust is provided for the kitchen and baths to remove odors.

2.4.4. Domestic Hot Water

Domestic Hot Water for the building is provided by an A.O. Smith natural gas-fired hot water storage tank. The storage tank has a capacity of 60 gallons of storage and an intput of 120 MBtuh. This standard efficiency equipment has an efficiency rating of approximately 78%.

It is not cost-effective to replace the existing water heating equipment with higher efficiency equipment. However, higher efficiency water heating equipment will save energy and should be strongly considered upon replacement of the equipment. Energy saving appliances bearing the ENERGY STAR label should be selected to ensure efficiency performance. Incentives may be available to offset any added costs for the installed equipment.

More efficient water-consuming fixtures and appliances save both energy and money through reduced energy consumption for water heating, as well decreased water and sewer bills. SWA recommends adding controlled on/off timers on all lavatory faucets to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce hot water consumption. In addition, routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – Most of the light fixtures throughout Mercerville Elementary School appear to be updated electronic ballasts with efficient fluorescent lighting. But there were still approximately 42 fixtures that still consisted of T12 bulbs and/or magnetic ballasts. There were also approximately 81 incandescent bulbs that should be upgraded to CFL replacements. SWA recommends replacing any magnetic ballast with electronic ballasts and all T12 fluorescent bulbs with T8 fluorescent bulbs. Replacing the magnetic ballasts alone will result in a 15-20% savings per light fixture and replacing T12 bulbs with T8 bulbs will result in an additional 10-15% savings per light fixture. SWA recommends replacing incandescent bulbs with compact fluorescent bulbs. SWA also recommends taking advantage of lighting on

different switches and use only lighting needed in classrooms. See the lighting schedule attached in the Appendix A for complete lighting retrofit details.

SWA recommends taking advantage of lighting on different switches and use only lighting needed in classrooms.

Although natural day lighting has been shown to improve occupant health, solar heat gain and glare from older glazing often negatively impact activities and comfort within the space. During the time of our visit (spring break week) shades were half drawn throughout the school. To understand the comfort concerns and identify those classrooms with the most significant problems, building staff can conduct an occupant survey. For problem areas, it may be beneficial to install tinted glazing or a window film to reduce the glare and solar heat gains. This recommendation will not provide energy savings but may improve occupant comfort.

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 315kwh/hr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Look for the Energy Star label when replacing appliances and equipment, including: window air conditioners, 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

Computers left on in classrooms 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 classrooms use approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all classrooms 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.

Educating both students and staff is a great way for schools to save energy while raising awareness about the importance of energy-efficiency. Prizes and challenges can be used to get classes involved in finding creative ways to reduce and monitor energy usage throughout the school. There are many free resources available to help Students, Parents, and School Administrators incorporate energy into school curricula and every day activities.

2.5.3. Elevators

There are no elevators at Mercerville Elementary School.

2.5.4. Other electrical systems

There are currently no other electrical systems in the building.

3. EQUIPMENT LIST

Building System	Description	Make/ Model	Fuel	Space served	Estimated Remaining useful life %
Heating	(2) Steam Boilers, 215 HP each	HB Smith	Natural Gas	Building	95%
Distribution System	Floor mounted Unit ventilators/radiators with unit-mounted adjustable valve and fan controls	Nesbitt	Steam	Each Classroom	Varies
Cooling	No Central Cooling				
Ventilation	Outdoor Intake in Unit Ventilators, Exhaust for kitchens and baths.				
Domestic Hot Water	Tank-type Water Heater, 60 gallon, 120 Mbtuh	A.O. Smith	Natural Gas	Building	10%
Lighting	See details appendix A	-	-	-	-

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 this building, SWA has separated the investment opportunities into three categories of recommendations:

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

- Asbestos Abatement – As noted previously, asbestos was observed in the buildings and is considered a health and safety hazard. Any asbestos on the mechanical systems that was not removed during the boiler replacement project may impact the ability of the building operations staff to conduct routine maintenance without incurring additional costs associated with proper safety measures. Regardless of the recommendations adopted to upgrade the energy-efficiency of the facility, SWA recommends an asbestos abatement project using only licensed asbestos contractors as the first priority.

Category II Recommendations: Operations and Maintenance

- Pipe Insulation – The energy efficiency of the heating plant and distribution system can be improved and maintained by repairing and/or replacing any damaged pipe insulation that was not addressed during the boiler upgrade project. This recommendation can easily be undertaken by maintenance personal for minimal cost. However, the existence of any remaining asbestos may impact the cost associated with this recommendation. For this reason, asbestos abatement has been identified as a high priority investment.
- Steam Traps – Similarly, the energy efficiency of the heating plant and distribution system can be improved and maintained by repairing and/or replacing any damaged steam traps that were not addressed during the boiler upgrade project. SWA recommends that building personnel conduct a steam trap inventory to determine the scope of the project. Project costs will vary, depending on the number of traps and the type of upgrade required. Any asbestos not removed during the boiler replacement project may impact the cost associated with this recommendation. For this reason, asbestos abatement has been identified as a high priority investment.
- Controls Optimization – Is is SWA's understanding that the existing Automated Logic Control panel is used to remotely control on/off boiler operation for all buildings by the District Facility Manager. This panel can be optimized and/or expanded to either shut down or reset the boilers based on outdoor temperature. This may require additional sensors and programming by a Controls professional. However, utilization of the existing equipment makes this a relatively simple and cost-effective recommendation.
- Weather Stripping/Air Sealing - SWA observed that exterior door weather-stripping 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 frame. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Water Efficient Fixtures & Controls - Adding controlled on/off timers on all lavatory faucets is a cost-effect 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-consuming fixtures and

appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water and sewer bills.

- Create an educational program that teaches both students and their teachers how to minimize their energy use in the classroom. The US Department of Energy offers free information for hosting energy efficiency educational programs and K-12 lesson plans, for more information please visit: http://www1.eere.energy.gov/education/

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description
1	**Lighting Upgrade; See appendix A for entire lighting retrofit schedule.**

ECM#1: *Lighting Upgrade*

Description:

Mercerville Elementary School contains mostly updated T8 fluorescent lighting with electronic ballasts but there were still approximately 42 fixtures that need to be upgraded from T12 fluorescent lighting with magnetic ballast. Mercerville also contained approximately 81 incandescent bulbs that should be upgraded to Compact Fluorescent Lights (CFLs). SWA recommends replacing all T12 lighting with more efficient T8 lighting. It is important that all magnetic ballasts be replaced with electronic ballasts. SWA also recommends replacing any incandescent lighting with CFLs in order to save electricity usage, costs and maintenance costs. For a complete existing and retrofit lighting schedule, please see Appendix A.

Installation cost:

Estimated installed cost: $9,615
Source of cost estimate: RS *Means*

Economics:

1st year energy savings					SPP	LoM	lifetime		Annual Carbon Reduction (lbs of CO2)
usage	unit	demand	unit	$ savings/yr			cost savings	ROI	
14,555	kWh	1.7	kW	$ 2,256	4.3	20	$ 45,121	18.5%	26,061

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit, and billing analysis.

Rebates/financial incentives:

NJ Clean Energy – Prescriptive Lighting Incentive, Incentive based on installing T5 or T8 lamps with electronic ballasts in existing facilities ($10-$30 per fixture, depending on quantity of lamps).

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 are currently no existing renewable energy systems.

5.2. Solar Photovoltaic

Photovoltaic (PV) technology would not be cost beneficial to this project since there is such little electric demand. Also, the school is not in session during the summer when photovoltaic panels would be most beneficial.

5.3. Solar Thermal Collectors

Solar thermal collectors are not cost effective for this project and are not be recommended due to the low amount of domestic hot water use throughout the building.

5.4. Combined Heat and Power

CHP is not applicable to this project because of the HVAC system type and limited domestic hot water usage.

5.5. Geothermal

Geothermal is not applicable to this project because it would require modifications to the existing heat distribution system, which would not be cost effective.

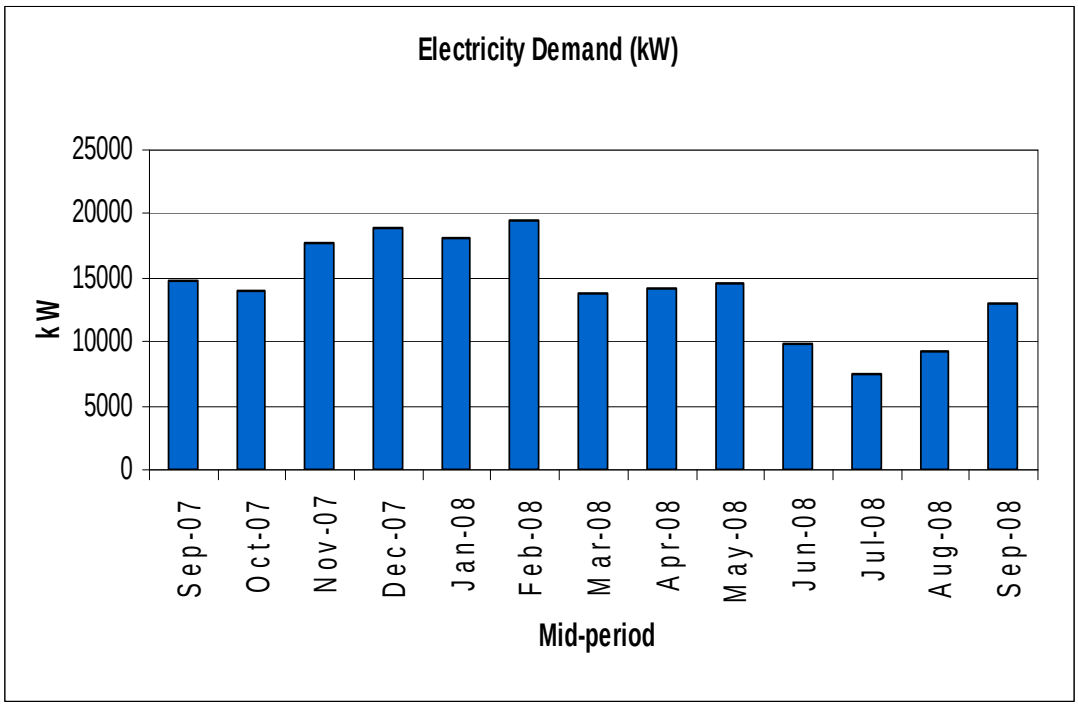
5.6. Wind

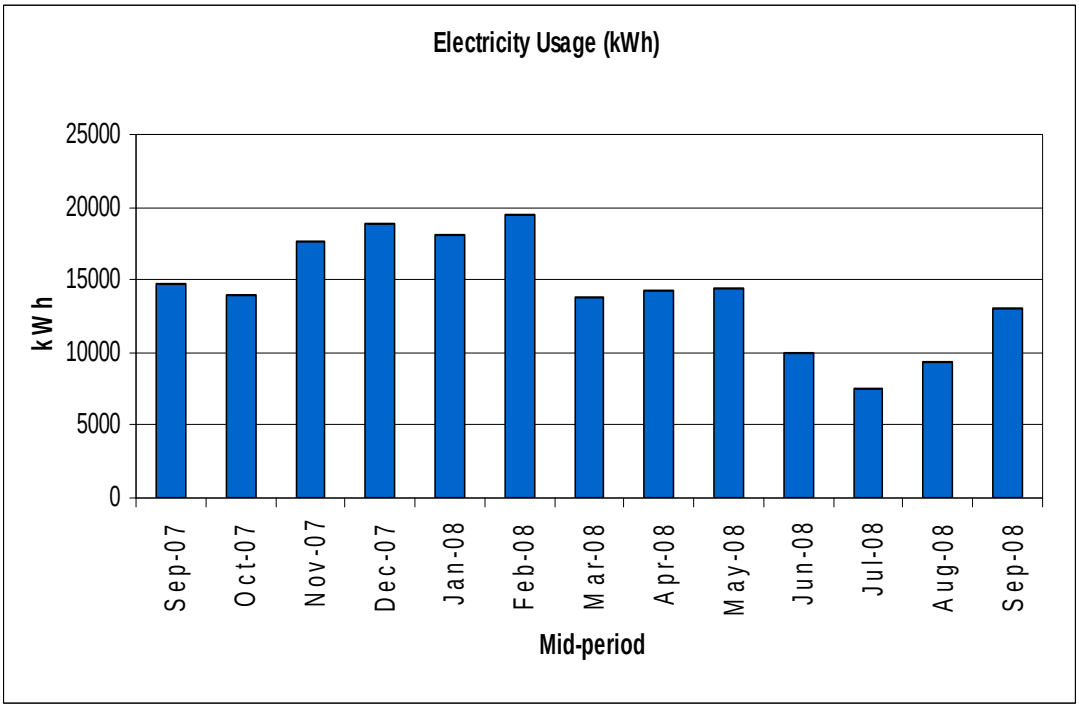
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

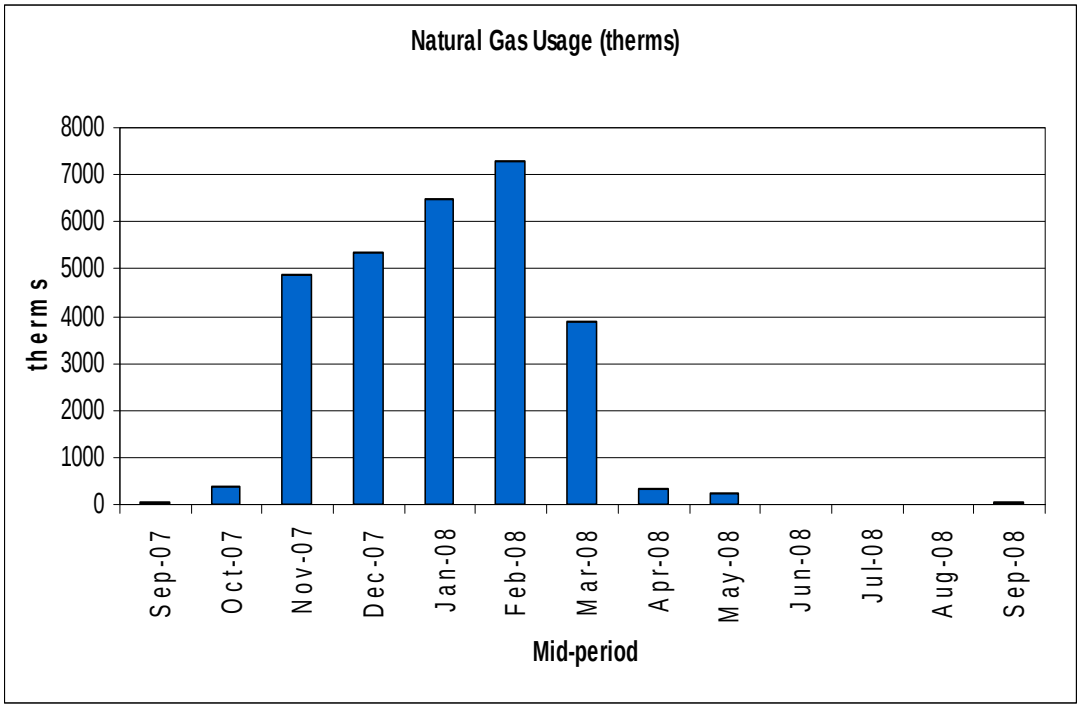
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

The average electrical peak demand for the previous year was 52.9 kW and the maximum peak demand was 59.2 kW. The electric and gas load profiles for this project are presented in the following charts. The first chart shows electric demand (in kW) for the previous 12 months and the other two charts show electric and gas usage (in kWh), respectively.


Electricity Demand (kW)
25000
20000
15000
10000
5000
0
kW
Sep-07
Oct-07
Nov-07
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Mid-period


Electricity Usage (kWh)
25000
20000
15000
10000
5000
0
kWh
Sep-07
Oct-07
Nov-07
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Mid-period



6.2. Tariff analysis

The school currently buys electricity and gas from PSE&G at the FTLV rate. FTLV is a typical rate structure where customers pay for natural gas based on usage and electricity based on usage with the addition of an electrical demand charge. The FTLV rate is appropriate for this building. No information on gas transportation charges was provided for this analysis.

6.3. Energy Procurement strategies

Billing analysis shows price fluctuations of over 20% over the course of the year for the building electrical and natural gas accounts. Customers that have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier. Contact the NJ Energy Choice Program for further information on Energy Services Companies (ESCOs) that can act as third party energy suppliers. Purchasing electricity from an ESCO can reduce electric rate fluctuation and ultimately reduce the annual cost of energy for the school. Appendix C contains a complete list of third party energy suppliers.

The building would not be eligible for enrollment in a Demand Response Program because the minimum electric demand each month does not greatly exceed 50 kW, which is the typical threshold for considering this option.

7. METHOD OF ANALYSIS

7.1. Assumptions and methods

Energy modeling method:	Spreadsheet-based calculation methods
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Note: 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

Existing Lighting Conditions																Proposed Lighting Improvements									
#	Building	Level/Floor	Location in Building	Fixture #	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/Lamp	Hrs/Day	Energy Use (Watt hours/day)	Controls	Daylighting possible?	Total Power (Watts)	Fixture #	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/Lamp	Hrs/Day	Energy Use (Watt hours/day)	Total Power (W)
1	1911	Ground Floor	Library	2F32T8	2' linear T8	Electronic	18	36	Flouresent	32	8	9,216	SP Switches	Yes	1152	2F32T8	2' linear T8	Electronic	18	36	Flouresent	32	8	9216	1152
2	1911	Ground Floor	Library	4F32T8	4' linear T8	Electronic	1	4	Flouresent	32	8	1,024	SP Switches	Yes	128	4F32T8	4' linear T8	Electronic	1	4	Flouresent	32	8	1024	128
3	1911	Ground Floor	Hallway-5	1INC150	150w bulb	-	5	5	Incandescent	150	11	8,250	SP Switches	No	750	25w CFL	CFL	-	5	5	CFL	25	11	1375	**125**
4	1911	Ground Floor	Preschool Room#G	4F32T8	4' linear T8	Electronic	8	32	Flouresent	32	8	8,192	SP Switches	Yes	1024	4F32T8	4' linear T8	Electronic	8	32	Flouresent	32	8	8192	1024
5	1911	Ground Floor	Hallway-4	2F96T12	8' linear T12	Electronic	2	4	Flouresent	32	11	1,408	SP Switches	No	128	2F59T8	8' linear T8	Electronic	2	4	Flouresent	22.4	11		**89.6**
6	1911	Ground Floor	Cafeteria	2F32T8	2' linear T8	Electronic	15	30	Flouresent	32	8	7,680	SP Switches	Yes	960	2F32T8	2' linear T8	Electronic	15	30	Flouresent	32	8	7680	960
7	1911	Ground Floor	Kitchen	4F32T8	4' linear T8	Electronic	3	12	Flouresent	32	8	3,072	SP Switches	No	384	4F32T8	4' linear T8	Electronic	3	12	Flouresent	32	8	3072	384
8	1928	Ground Floor	Storage B1	2F32T8	2' linear T8	Electronic	3	6	Flouresent	32	2	384	SP Switches	No	192	2F32T8	2' linear T8	Electronic	3	6	Flouresent	32	2	384	192
9	1928	Ground Floor	Storage B2	1INC150	150w bulb	-	2	2	Incandescent	150	2	600	SP Switches	No	300	25w CFL	CFL	-	2	2	CFL	25	2	100	**50**
10	1928	Ground Floor	Fac. Room	2F32T8	2' linear T8	Electronic	4	8	Flouresent	32	8	2,048	SP Switches	Yes	256	2F32T8	2' linear T8	Electronic	4	8	Flouresent	32	8	2048	256
11	1948	Ground Floor	Boiler Room	3CF13	13w CFL	-	7	13	CFL	13	2	338	SP Switches	No	169	3CF13	CFL	-	7	13	CFL	13	2	338	169
12	1952	Ground Floor	Hallway-6	4F17T8		Electronic	9	36	Flouresent	17	11	6,732	SP Switches	No	612	4F17T8		Electronic	9	36	Flouresent	17	11	6732	612
13	1952	Ground Floor	Kindergarten Room-B	2F48T12	4' linear T8	Magnetic	4	8	Flouresent	48	8	3,072	SP Switches	Yes	384	2F32T8	4' linear T8	Electronic	4	8	Flouresent	32	8	2048	**256**
14	1952	Ground Floor	Kindergarten Room-B	2F96T12	8' linear T12	Magnetic	4	8	Flouresent	96	8	6,144	SP Switches	Yes	768	2F59T8	8' linear T8	Electronic	4	8	Flouresent	59	8	3776	**472**
15	1952	Ground Floor	Kindergarten Room-D	2F48T12	4' linear T8	Magnetic	4	8	Flouresent	48	8	3,072	SP Switches	Yes	384	2F32T8	4' linear T8	Electronic	4	8	Flouresent	32	8	2048	**256**
16	1952	Ground Floor	Kindergarten Room-D	2F96T12	8' linear T12	Magnetic	4	8	Flouresent	96	8	6,144	SP Switches	Yes	768	2F59T8	8' linear T8	Electronic	4	8	Flouresent	59	8	3776	**472**
17	1952	Ground Floor	Grade 1 Room-F	2F96T12	8' linear T12	Magnetic	3	6	Flouresent	96	8	4,608	SP Switches	Yes	576	2F59T8	8' linear T8	Electronic	3	6	Flouresent	59	8	2832	**354**
18	1952	Ground Floor	Grade 1 Room-F	2F48T12	4' linear T8	Magnetic	5	10	Flouresent	48	8	3,840	SP Switches	Yes	480	2F32T8	4' linear T8	Electronic	5	10	Flouresent	32	8	2560	**320**
19	1952	Ground Floor	Grade 1 Room-E	2F48T12	4' linear T8	Magnetic	4	8	Flouresent	48	8	3,072	SP Switches	Yes	384	2F32T8	4' linear T8	Electronic	4	8	Flouresent	32	8	2048	**256**
20	1952	Ground Floor	Grade 1 Room-E	2F96T12	8' linear T12	Magnetic	4	8	Flouresent	96	8	6,144	SP Switches	Yes	768	2F59T8	8' linear T8	Electronic	4	8	Flouresent	59	8	3776	**472**
21	1952	Ground Floor	Kindergarten Room-C	2F96T12	8' linear T12	Magnetic	3	6	Flouresent	96	8	4,608	SP Switches	Yes	576	2F59T8	8' linear T8	Electronic	3	6	Flouresent	59	8	2832	**354**
22	1952	Ground Floor	Kindergarten Room-C	2F48T12	8' linear T12	Magnetic	5	10	Flouresent	48	8	3,840	SP Switches	Yes	480	2F32T8	8' linear T8	Electronic	5	10	Flouresent	32	8	2560	**320**
23	1952	Ground Floor	GT/Speech Room-A	3F32T8	3' linear T8	Electronic	5	15	Flouresent	32	8	3,840	SP Switches	No	480	3F32T8		Electronic	5	15	Flouresent	32	8	3840	480
24	1952	Ground Floor	ESL/CST	3F32T8 w/ef		Electronic	3	9	Flouresent	32	8	2,304	SP Switches	No	288	3F32T8 w/ef	3' linear T8	Electronic	3	9	Flouresent	32	8	2304	288
25	1952	Ground Floor	Nurse	3F32T8 w/ef		Electronic	11	33	Flouresent	32	8	8,448	SP Switches	Yes	1056	3F32T8 w/ef	3' linear T8	Electronic	11	33	Flouresent	32	8	8448	1056
26	1952	Ground Floor	Closets	1INC60	60w bulb	-	1	3	Incandescent	60	2	360	SP Switched	No	180	15w CFL	CFL	Electronic	1	3	CFL	15	2	90	**45**
27	1995	Ground Floor	Hallway-7	4F32T8	4' linear T8	Electronic	7	28	Flouresent	32	11	9,856	SP Switched	Yes	896	4F32T8	4' linear T8	Electronic	7	28	Flouresent	32	11	9856	896
28	1995	Ground Floor	Grade 2 Room-J	4F32T8	4' linear T8	Electronic	12	48	Flouresent	32	8	12,288	SP Switched	Yes	1536	4F32T8	4' linear T8	Electronic	12	48	Flouresent	32	8	12288	1536
29	1995	Ground Floor	Grade 1 Room-K	4F32T8	4' linear T8	Electronic	12	48	Flouresent	32	8	12,288	SP Switched	Yes	1536	4F32T8	4' linear T8	Electronic	12	48	Flouresent	32	8	12288	1536
30	1995	Ground Floor	Closets	3CF13	13w CFL	-	2	6	CFL	13	2	156	SP Switched	No	78	3CF13	CFL	-	2	6	Flouresent	13	2	156	78
31	1948	First Floor	Stage	1INC60	60w bulb	-	48	48	Incandescent	60	2	5,760	SP Switched	No	2880	15w CFL	CFL	-	48	48	CFL	15	2	1440	**720**
32	1948	First Floor	Multipurpose Room	1INC500	500w bulb	-	6	6	Incandescent	500	8	24,000	SP Switched	Yes	3000	MHE140/MS	Metal Halide	-	6	6	Mtl Halide	140	8	6720	**840**
33	1928	First Floor	Boys Restroom	1CF13	13w CFL	-	1	1	CFL	13	8	104	SP Switches	No	13	1CF13	CFL	-	1	1	CFL	13	8	104	13
34	1928	First Floor	Stairwells	3CF13	13w CFL	-	2	6	CFL	13	11	858	SP Switches	No	78	3CF13	CFL	-	2	6	CFL	13	11	858	78
35	1928	First Floor	Girls Restroom	3CF13	13w CFL	-	1	1	CFL	13	8	104	SP Switches	No	13	3CF13	CFL	-	1	1	CFL	13	8	104	13
36	1911	First Floor	Hallway	1INC150	150w bulb	-	4	4	Incandescent	150	11	6,600	SP Switched	No	600	1CF36	CFL	-	4	4	CFL	36	11	1584	**144**
37	1911	First Floor	Grade 2 Room-4	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
38	1911	First Floor	Grade 2 Room-3	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
39	1948	First Floor	Main Office	2F32T8	2' linear T8	Electronic	10	20	Flouresent	32	8	5,120	SP Switched	Yes	640	2F32T8	2' linear T8	Electronic	10	20	Flouresent	32	8	5120	640
40	1948	First Floor	Grade 3 Room-1	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
41	1948	First Floor	Grade 3 Room-2	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
42	1948	Second Floor	Grade 4 Room-12	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
43	1948	Second Floor	Grade 5 Room 11	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
44	1948	Second Floor	Room-10	4F32T8	4' linear T8	Electronic	10	40	Flouresent	32	8	10,240	SP Switches	Yes	1280	4F32T8	4' linear T8	Electronic	10	40	Flouresent	32	8	10240	1280
45	1948	Second Floor	Faculty	4F32T8	4' linear T8	Electronic	1	4	Flouresent	32	8	1,024	SP Switched	Yes	128	4F32T8	4' linear T8	Electronic	1	4	Flouresent	32	8	1024	128
46	1931	Second Floor	Restroom	3CF13	13w CFL	-	1	3	CFL	39	8	936	SP Switched	No	117	3CF13	CFL	-	1	3	CFL	39	8	936	117
47	1931	Second Floor	Guide Room-15	2F32T8	2' linear T8	Electronic	2	4	Flouresent	32	8	1,024	SP Switched	No	128	2F32T8	2' linear T8	Electronic	2	4	Flouresent	32	8	1024	128
48	1911	Second Floor	Hallway-3	2F32T8	2' linear T8	Electronic	2	4	Flouresent	32	11	1,408	SP Switches	No	128	2F32T8	2' linear T8	Electronic	2	4	Flouresent	32	11	1408	128
49	1911	Second Floor	Grade 6 Room-9	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
50	1911	Second Floor	Grade 6 Room-8	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
51	1948	Second Floor	PR Room-00	4F32T8	4' linear T8	Electronic	4	16	Flouresent	32	8	4,096	SP Switched	Yes	512	4F32T8	4' linear T8	Electronic	4	16	Flouresent	32	8	4096	512
52	1948	Second Floor	Grade 3 Room-5	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
53	1948	Second Floor	Grade 4 Room-6	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6,144	SP Switches	Yes	768	2F32T8	2' linear T8	Electronic	12	24	Flouresent	32	8	6144	768
54	1948	Second Floor	Grade 4 Room-7	4F32T8	4' linear T8	Electronic	10	40	Flouresent	32	8	10,240	SP Switches	Yes	1280	4F32T8	4' linear T8	Electronic	10	40	Flouresent	32	8	10240	1280
55	1948	Second Floor	Coat Closets	1INC150	150w bulb	-	12	12	Incandescent	150	2	3,600	SP Switches	No	1800	1CF23	CFL	-	12	12	CFL	23	2	552	**276**
56	1948	Second Floor	Closets	1INC150	150w bulb	-	3	3	Incandescent	150	2	900	SP Switches	No	450	1CF23	CFL	-	3	3	CFL	23	2	138	**69**

** Indicates colored CFL available at blinkerboys.com

*** Please note Metal Halide lamps to be pulse start with electronic ballast.

Totals		Existing Lighting Total Power (Watts)	38400	Watts
Existing Usage (kWh/year)	73,206	Existing Lighting Power Density (W/sqft)	0.85	W/sqft
Proposed Usage (kWh/year)	58,651			
Existing Est. Cost ($/year)	$ 12,005.75	Proposed Lighting Total Power (Watts)	28634.8	Watts
Proposed Est. Cost ($/year)	$ 9,618.70	Proposed Lighting Power Density (W/sqft)	0.63	W/sqft
Total kWh Savings	14,555			
Total $ Savings	$ 2,387.05			

Appendix B: Third Party Energy Suppliers (ESCOs)

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 665-8457 www.commerceenergy.com
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East East Princeton, NJ 08450	(212) 547-2722 www.creditsuisses.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morriston, NJ 07962	(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
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 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 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) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.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 08057	(856) 273-9995 www.ugienergyservices.com

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Dominion Retail, Inc. 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 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 Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 www.hudsonenergyservices.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 www.systrumenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 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 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) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 www.stuyfuel.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com