UPPER TOWNSHIP SCHOOL DISTRICT
UPPER TOWNSHIP ELEMENTARY SCHOOL
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

CHA PROJECT NO. 24145

June 2012

Prepared by:

6 Campus Drive
Parsippany, NJ 07054

(973) 538-2120

TABLE OF CONTENTS

APPENDICES

REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±20%, and are based on data obtained from the owner, data obtained during site observations, professional experience, historical data, and standard engineering practice. Cost data does not include soft costs such as engineering fees, legal fees, project management fees, financing, etc.

A thorough walkthrough of the facility was performed, which included gathering nameplate information and operating parameters for all accessible equipment and lighting systems. Unless otherwise stated, model, efficiency, and capacity information included in this report were collected directly from equipment nameplates and /or from documentation provided by the owner during the site visit. Typical operation and scheduling information was obtained from interviewing facility staff and spot measurements taken in the field.

1.0 EXECUTIVE SUMMARY

The Upper Township School District recently engaged CHA to perform an energy audit in connection with the New Jersey Board of Public Utilities' Local Government Energy Audit Program. This report details the results of the energy audit conducted for:

Building Name	Address	Square Feet	Construction Date
Upper Township Upper Elementary School	50 Old Tuckahoe Road Marmora, NJ 08230	69,607	Original: 1952 Additions/Renovations: 1967 & 1986

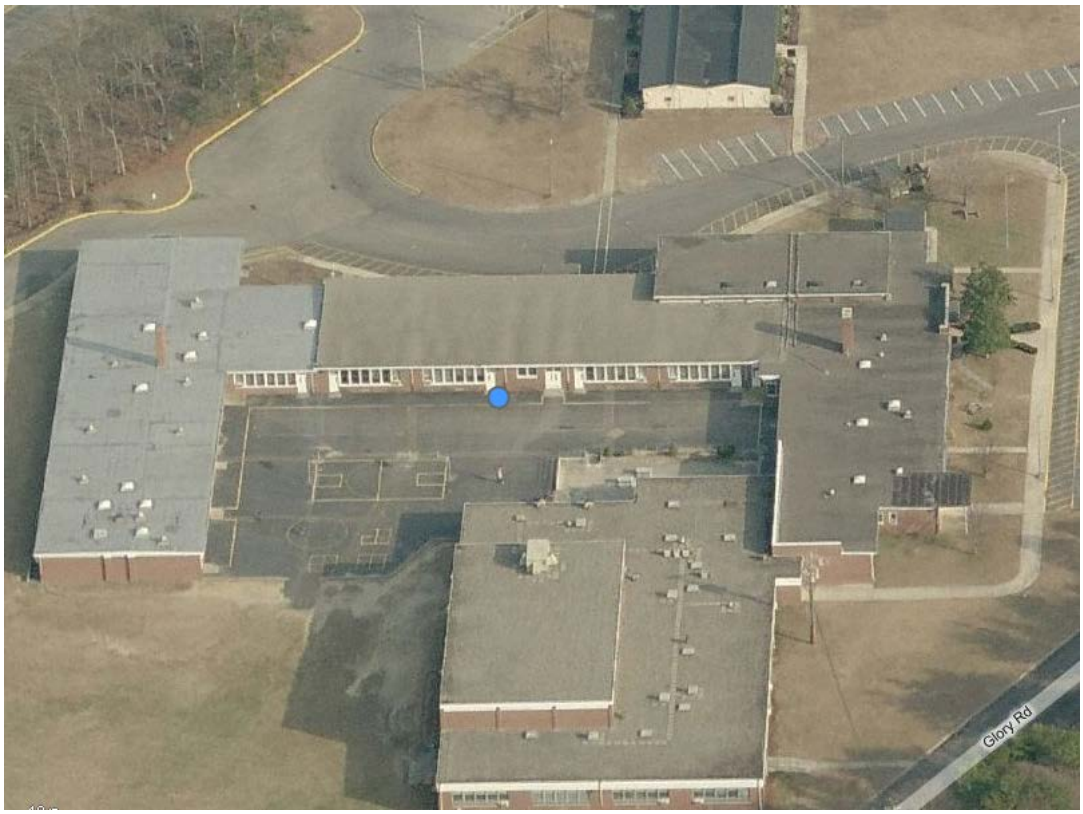
The Energy Conservation Measures (ECMs) identified in this report will allow for a more efficient use of energy and if pursued have the opportunity to qualify for the New Jersey SmartStart Buildings Program and/or Direct Install Program. Potential annual savings of $31,500 for the recommended ECMs may be realized with a payback of 7.5 years. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

Summary of Energy Conservation Measures							
Energy Conservation Measure		Approx. Costs ($)	Approx. Savings ($/year)	Payback (Years) w/o Incentive	Potential Incentive ($)*	Payback (Years) w/ Incentive	Recommended For Implementation
ECM-1	HVAC Condensing Boilers Addition	148,400	2,100	>20	6,000	>20	
2	Replace Domestic Water Heater (DWH)	23,600	2,800	8.4	600	8.2	X
3	HVAC Install Variable Speed Drives, High Efficiency Motors	22,500	2,300	9.8	3,180	8.4	X
4	HVAC Air Handling Equipment Replacement	64,500	0	>20	1,950	>20	
5	Replace Window A/C Units with Energy Star Units	8,500	300	>20	2,145	>20	
6	HVAC DX Split Systems Replacement	37,600	100	>20	1,300	>20	
7	HVAC Demand Control Ventilation	5,100	900	5.7	0	5.7	X
8	HVAC Building Automation System Upgrade/Re-commissioning	34,800	3,700	9.4	0	9.4	X
9	CoolTrol Walk-in Controls	15,000	700	>20	0	>20	
10	Variable Speed Kitchen Hood Controllers	34,600	700	>20	0	>20	
11	Replace Electric Kitchen Equipment with Natural Gas Equipment	38,900	9,000	4.3	0	4.3	X
12	Lighting Replacement Upgrades	101,100	7,500	13.5	18,625	11.0	
13	Lighting Controls Installation (Occupancy Sensors)	37,000	8,800	4.2	4,000	3.8	
14	Lighting Replacements with Lighting Controls (Occupancy Sensors)	138,100	12,800	10.8	22,625	9.0	X

2.0 INTRODUCTION AND BACKGROUND

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.

The Upper Township Elementary School located in Marmora, NJ, is a 69,607 square foot mainly single story block structure with high bay gym and cafeteria/stage areas. The majority of the HVAC equipment is located on rooftops over the areas being served. The building was constructed in 1952, with a later addition of classrooms and existing spaces renovation in 1967 and 1986. There is a 150 kW emergency power generator that supports emergency lights, life safety systems, and security/access control systems. Occupancy includes approximately 442 students and 62 faculty members. The elementary school operates Monday through Friday from 9:00 am to approximately 4:15 pm. The gym is also used on Saturday for athletic events between 8:00 am to 4:00 pm, and between 12:00 pm to 4:00 pm on Sunday.



3.0 EXISTING CONDITIONS

3.1 Building - General

Built in 1952, the Upper Township elementary school building is a 69,607 square foot, one-story facility with high bay areas for the gym and cafeteria/stage areas. Additional construction includes the addition of the Rooms 14 through 22 in 1967, and the Library - Room 50 in 1986. The main entrance comes into a lobby to the right of the main offices, on the south side of the building.

The elementary school has approximately 442 students and 62 faculty and staff, and appears to be fully utilized during the field inspection. The building can be assumed to be fully occupied by the 504 people until 4:15 pm during the week, and by approximately 150 people on Saturday and Sunday for the gym. Custodial staff is in the building for approximately seven hours after 4:15 pm during the week. The hours of operation are:

- Monday through Friday 9:00 am to 4:15 pm
- Saturday, gym only, 8:00 am to 4:00 pm & Sunday 12:00 pm to 4:00 pm

The original building is constructed of block walls and brick veneer with an air space between; this includes the taller high bay gym and cafeteria. The majority of the interior walls are block walls with painted plaster; some spaces, such as mechanical rooms and closets use painted block walls only. In spaces such as the main office and other renovated areas, 3-5/8" metal studs filled with fiberglass insulation finished with gypsum board are used.

The flat roof system is comprised of a structural wood framing on the original 1952 areas, and steel framing on the addition areas, with a metal deck having rigid foamboard insulation with various roofing systems on top. From left to right, Rooms 14 - 22 have a light colored EPDM membrane; Rooms 5 - 49, the cafeteria/stage, offices and Rooms 1, 2, 3, and 35 have a light-colored asphalt rolled roofing with stone ballast; and Rooms 29 - 50, the gym and library have a black EPDM membrane with stone ballast. Windows are minimal (<20% on walls where used), and are double pane set in aluminum frames with no tint; they are in fair condition. A window replacement is slated for the 2012, 2013 school years to change out all existing windows. The majority of the entrance doors are part glass, part solid metal. The elementary school has exposed walls facing the north, east, south and west. The majority of the single story classroom blocks/wings are 14' in height, with the gym, and cafeteria being approximately 25' tall. A 25' tall stage is at the westernmost part of the building.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity is delivered by Atlantic City Electric and supplied by South Jersey Energy Company. Natural gas is delivered by South Jersey Gas, and supplied by South Jersey Gas. Potable water is provided by New Jersey American Water. See Appendix A for a detailed utility analysis.

The elementary school has one electric meter serving the school building. From February 2011 through January 2012, the electric usage was approximately 469,500 kWh at a cost of about $69,000. Review of electricity bills during this period showed that the complex was charged at the following rates: supply unit consumption cost of $0.0.113 per kWh; demand unit cost of $7.07 per kW; and blended unit cost of $0.147 per kWh. The elementary school had a maximum electricity demand of 141.0 kW and minimum

of 57.0 kW. The monthly average over the observed 12 month period was 119.0 kW. Electrical usage was generally higher in the summer months when air conditioning equipment was operational.

The elementary school has one natural gas meter. From March 2011 through February 2012, gas-fired equipment consumed about 23,580 therms of natural gas. Based on the annual cost of $23,500, the blended price for natural gas was $1.00 per therm. Natural gas consumption was highest in winter months for heating.

The delivery component of the electric and natural gas bills will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party; as is currently the case with electricity and natural gas. The electricity or natural gas commodity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. According to the U.S. Energy Information Administration, the average commercial unit costs of electricity and natural gas in New Jersey during the same periods as those noted above was $0.141 per kWh and $0.959 per therm. When compared to the average state values, it is recommended that the present electricity supplier be maintained and present electricity supply rate charge be monitored and checked monthly. The electricity supply rate charged by South Jersey Energy Company for the 12 month period resulted in a slightly greater cost to the school district when compared to average state values. It is recommended that the present electricity supplier be maintained, and present electricity supply rate charge be renegotiated. Electric bills should be monitored and checked monthly. When compared to the average state values, it is recommended that the present natural gas be maintained, and monitored and checked monthly.

A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

The systems and equipment described below serve the elementary school building. Specifics on the mechanical equipment can be found within the equipment inventory located in Appendix B.

3.3.1 Heating Hot Water Systems

The elementary school building is heated with hot water supplied by two HB Smith cast iron sectional gas fired boilers with factory full modulation gas burners. The boilers were installed in 1952, and are located in the boiler room. The hot water system operates from October until April, and the boilers are shut down during the summer.

The boilers are piped to a primary loop pumping system with two 5 HP pumps that operate in lead-lag, and serve the 1986 building addition areas. A second primary loop pumping system with two 3.0 HP pumps that operate in lead-lag serve the 1952 and 1967 building areas. The pumps are constant volume with standard efficiency motors, and a 3-way modulating valve for system control. Hot water is provided to the rooftop heating and ventilating units, classroom unit ventilators, recessed ceiling cabinet heaters, and fintube radiation. Hot water system piping and valves appear to be insulated.

3.3.2 Heating & Ventilation Air Handling Unit

One hot water heating and ventilation (HV) air handling unit is located on the roof above the area it serves. The RTU is mounted on an extended curb, with outside air intake and relief air dampers, and air mixing box. Supply and return ductwork is routed down through the roof curbs to a duct distribution system above the ceiling to the space. This rooftop unit serves the gym.

3.3.3 Unit Ventilators

Rooms and spaces with exterior wall exposures are ventilated and heated by 34 vertical floor mounted cabinet unit ventilators; mechanical cooling is provided by window units. Outside air is drawn through low sidewall louvers, and a heating and piping system provides hot water during the heating season.

Art Room 21 exposures are ventilated and heated by one horizontal ceiling mounted cabinet unit ventilator; mechanical cooling provided by window unit. Outside air is drawn through a rooftop makeup air duct, and hot water piping provides heating during the heating season.

3.3.4 DX Cooling Split System Units

One split system direct expansion (DX) cooling only fan coil unit (FCU) is an indoor ceiling mounted air handler; the condensing unit is located above the area/space being served. The split system DX fan FCU provides additional spot cooling in the Computer Lab Room 28.

Four split system DX cooling air conditioners with an indoor ceiling mounted air handlers and their condensing units are located above the area/space being served. The split system DX air conditioners serve the Library Room 32, Room 50, and additional areas.

3.3.5 Window Units

There were 33 window units installed to provide additional cooling in classrooms and other areas; this includes special education rooms, and spaces that are used year-round. The window units are the main source of cooling for the elementary school, and are controlled by unit mounted thermostat and operate stand alone.

3.3.6 Hydronic Heating Systems

Corridors, entrance vestibules, toilets in 1952 areas of the building and some spaces with exterior wall exposures are heated by perimeter hot water fintube radiators with wall mounted thermostats. Other HVAC equipment, including rooftop units (RTUs) and unit ventilators (UVs) provide cooling/ventilation and outside air for these spaces.

Corridors and entrance vestibules in the 1986 addition are heated by ceiling mounted hot water cabinet unit heaters controlled by space thermostats.

3.3.7 Kitchen Equipment

The cafeteria kitchen contains a 6’x10’ walk-in cooler and a 6’x10’ walk-in freezer.

Kitchen ventilation is provided by a single 10’x4’ cooking hood with a 3.0 HP constant volume fan mounted on a rooftop curb with ductwork connecting to the hood.

The kitchen cooking equipment includes a steamer, tabletop kettle, double-stack oven, and food warmer; all this equipment is electric, and totals about 72.7 Kw of power consumption when operating.

3.3.8 Exhaust Systems

Exhaust system fans are integrated into the elementary school building automation system, and generally operate during building occupancy.

Common exhaust plenums serve classrooms with rooftop mounted constant volume exhaust fans. Larger classrooms and spaces, such as the gym and cafeteria/stage, have dedicated exhaust fans. Exhaust fans are used for restrooms and custodial closets throughout the building, and the locker room areas each have a dedicated exhaust fan located on the roof.

3.4 Control Systems

The school is controlled by a Robertshaw building automation system (BAS). The system consists of mainly pneumatic field devices and components; all pneumatic controls are integrated into a computerized front end running the BAS software for equipment sequencing, scheduling, monitoring, and alarming. This includes the hot water system boilers/pumps, heating and ventilation units, RTUs, UVs, cabinet heaters, fintube radiation, and exhaust system fans. Window units operate standalone and are not tied into the BAS.

Each unit ventilator or split system has a wall mounted thermostat; setpoints in the building are 68°F heating and 74°F cooling during occupied times, and 55°F heating and 85°F cooling during unoccupied times. However, thermostats can be adjusted by the occupants to override the centralized control system.

The BAS uses an outdated DOS-based interface that is not user friendly, and is not as functional as systems using current technology; the controls are functional due to the diligent maintenance and oversight by Township facilities personnel. The BAS system requires a complete software and field devices upgrade/replacement with modern DDC controls. This will require recommissioning which should include the BAS front end system, software upgrade, graphics interface, BAS controllers/field devices, HVAC equipment controllers/components and HVAC systems dampers, and valves that are not part of equipment. This should be coordinated with a complete system's testing and balancing effort that must occur prior to system recommissioning efforts.

This would allow more accurate control of HVAC systems, prevent local thermostat adjustment by occupants, allow improved trending/logging functions and insure proper ventilation is being provided. Improved trending and logging aids in identifying improved scheduling and systems startup times. HVAC systems will be tuned up during this process, which should result in more efficient operation.

3.5 Lighting/Electrical Systems

The facility has reballasted and relamped all existing fixtures since the building was erected. The facility primarily consists of fixtures with T-8 32 watt bulbs; compact fluorescent twin biaxial bulbs, compact fluorescent spiral bulbs, and older incandescent bulbs are also used in select areas. Metal halides are used in the high bay gym. The primary source of control for the lights is switches which the teachers and custodial staff turn off at the end of the school day. All magnetic ballasts have been upgraded to electronic.

Exterior lights consist of a mix of wall pack fixtures with metal halide, high pressure sodium, and mercury vapor bulbs on daylight sensors and timers. Incandescent bulbs are used in recessed can-type canopy lights. The light fixtures listed in the report and analyses are powered by the elementary school building electrical system and are part of the lighting analysis.

3.6 Plumbing Systems

3.6.1 Domestic Hot Water System

Mechanical Room 45 contains one 40 gallon, 4.5 kW Bradford White electric hot water heater installed in 1986; it serves Rooms 16 - 49. The boiler room contains one 75 gallon, Bradford White standard-efficiency, natural gas tank hot water heater installed in 1989; this serves Rooms 1 – 13 and 35, the cafeteria, and main office areas. The kitchen dry storage contains one 120 gallon, 5.5 kW State Industries electric hot water heater installed in 1986 which serves the kitchen. The gym storage/mechanical room contains two 120 gallon, 5.5 kW State Industries electric hot water heater installed in 1986 which serves the gym restrooms and lockers. Hot water is provided to toilets, lockers, and janitor's closets and the majority of the hot water piping appears to be insulated. Water demand is primarily for the cafeteria kitchen, which is managed by one dedicated hot water heater; additional building hot water demand is minimal as gym showers are not used. Domestic hot water temperature is maintained at 140°F, and chemical disinfection soap is provided at the toilet rooms.

3.6.2 Plumbing Fixtures

The elementary school's original lavatories, water closets, and urinals are being replaced with low flow plumbing fixtures during renovations, and through attrition. Lavatories are 2.5 GPM with push type faucets, water closets are 1.6 GPF, and urinals are 1.0 GPF.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 HVAC Condensing Boilers Added To Replace Existing

The building is heated with hot water supplied by two HB Smith cast iron section boilers from 1952. These boilers are non-condensing and have an estimated efficiency of 69%.

Due lower efficiency of the two existing boilers, replacing them with two higher efficiency condensing boilers was assessed. The majority of the savings will be achieved during the shoulder months when the lower return water temperature enables the condensing boiler to achieve the highest efficiencies. There will also be savings during peak heating months because the existing boilers efficiency is 69% compared to 80% of standard boilers.

The boiler load was calculated from the natural gas used annually per utility bills and boiler efficiency. The load was then compared to the efficiency of a new condensing boiler at the improved operating efficiency. The difference in fuel usage was the savings.

Natural gas-fired boilers have an expected life of 25 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 51,750 therms of natural gas and $52,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-1 HVAC Condensing Boilers Added To Replace Existing

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
148,400	0	0	2,070	2,100	0	2,100	(0.7)	6,000	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.2 ECM-2 Replace Domestic Water Heater (DWH)

The elementary school has five domestic hot water heaters that provide hot water to the facility. All but one of the units are electric and should to be replaced with units that use less costly natural gas. During periods of little or no domestic hot water use, the units must still heat the water within their storage tank. Energy required maintaining the 355 gallons of hot water setpoint during times of zero demand is known as standby losses; replacement of these units with higher efficiency natural gas units was assessed.

According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on a typical tank-type, high efficiency, condensing hot water heater; it was calculated that an additional 800 therms of natural gas would be used per year. The new water heater will require gas and water piping modifications, venting, and electrical connections.

Domestic hot water heaters have an expected life of 12 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 295,320 kWh electricity, and $33,600.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-2 Replace Domestic Water Heater (DWH)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
23,600	24,610	0	-810	2,800	0	2,800	0.4	600	8.4	8.2

* Incentive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.3 ECM-3 Install Variable Frequency Drives, High Efficiency Motors

The hot water system is served by two 5.0 HP pumps each serving a building area (P-1/P-2), and one 3.0 HP pump serving a zone (P-3). The pumps are constant volume with standard efficiency motors.

Larger motors that operate pumps and fans continuously waste electrical energy. The hot water system pumps serving the HVAC systems operate at a constant speed (water flows) even though the building load does not require all the flow to maintain temperatures. By adding inverter duty, high efficiency motors with variable speed drives (VSDs) to reduce the flow by slowing the motors down, significant electrical energy can be saved. Pressure actuated controllers are used to measure the water system pressure and as valves close, the system pressure increases and pump speed is reduced.

The assumption of this calculation is that the operating hours, motor horsepower, and capacity stay the same. The energy savings result from operating higher efficiency motors and reducing power draw with the VSDs compared to the existing.

Motors and variable speed drives have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 307,200 kWh and $46,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-3 HVAC Install Variable Speed Drives, High Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
22,500	15,360	0	0	2,300	0	2,300	1.0	3,180	9.8	8.4

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.4 ECM-4 HVAC Air Handling Equipment Replacement

One ventilation and hot water heating RTU from 1967 serves the gym (HV-1). Replacement of this unit with a modern AAON unit with supply fan VSD and digital scroll compressors was assessed. The new unit will include DX cooling for the space, which was previously only ventilated.

The assumption of this calculation is that the operating hours, number of units, and capacities stay the same. DX cooling will be added to condition the space. The energy savings are due to operating higher efficiency units.

DX rooftop units have an expected life of 15 years, according to ASHRAE, and there are no notable energy savings over the life of the project. However, this unit should be replaced through attrition. Preliminary ECM analysis shows the new unit will consume approximately the same amount of electricity with added DX cooling as it does currently with motor electrical draw alone. This is only an approximation and should be investigated during equipment replacement design.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-4 HVAC Air Handling Equipment Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
64,500	1	0	0	0	0	0	(1.0)	1,950	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.5 ECM-5 Replace Window A/C Units With Energy Star Units

The elementary school is equipped with (29) 1 ton and four 1.5 ton window mounted AC units for classrooms and other spaces. These units are standard efficiency, and the condition of some units ranges from fair to poor. Replacement of the existing window units with newer energy star appliances was assessed. It is assumed that the maintenance staff will install the units.

The assumption of this calculation is that the operating hours and capacity stay the same.

AC window units have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 25,950 kWh and $4,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as follows:

ECM-5 Replace Window A/C Units with Energy Star Units

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
8,500	1,730	0	0	300	0	300	(0.6)	2,145	>20	>20

* Incentive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.6 ECM-6 HVAC DX Split Systems Replacement

Four Trane DX split system condensing units serve DX cooling only coils located in FCUs and air handlers located above the spaces they serve; one unit is not operational. Replacement of the outdoor condensing units by more modern units with higher operating efficiencies was assessed.

The assumption of this calculation is that the operating hours and capacities of all equipment stay the same; energy savings result from the higher efficiency.

Split systems units have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 15,150 kWh and $1,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-6 HVAC DX Split Systems Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
37,600	1,010	0	0	100	0	100	(0.9)	1,300	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.7 ECM-7 HVAC Demand Control Ventilation

A heating and ventilation air handling unit serves the gym (HV-1). It is assumed the original system controls provide the full design ventilation outside air flow. Reducing outside air during occupied time periods will reduce heating and cooling energy used during occupied periods. The quantity of ventilation will be based on maintaining an acceptable carbon dioxide (CO_2) level in the space as an indicator of indoor air quality. A limit of 1000 PPM of CO_2 is recommended in ASHRAE Standard 62-1982, Ventilation for Acceptable Indoor Air Quality. Sensors will be installed to measure the building CO_2 concentration, and the control sequence of operation programmed into the BAS. During unoccupied periods, the outside air dampers should be closed.

Equipment supply and outside airflows were obtained from existing design drawings where possible, or from vendors per serial/model numbers found in the field. For the analysis, estimated savings for demand control ventilation are based on reducing equipment run times per day from 12 to 10 hours; equipment fans can be turned off for two hours/day due to demand control ventilation. The energy savings are the differences in utility usage.

Controls have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 80,460 kWh, 3,546 therms, and $16,200.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-7 HVAC Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,100	4,470	0	197	900	0	900	2.0	0	5.7	5.7

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.8 ECM-8 HVAC Building Automation System Upgrade/Re-commissioning

The current elementary school controls consist of an outdated pneumatic Robertshaw BAS for monitoring and sequencing all HVAC systems and equipment. Due to the BAS' condition and software, HVAC system sequencing, scheduling and monitoring are limited; pneumatic control field devices, instrument air tubing, and compressor are also maintenance intensive. To reduce HVAC system energy usage, at a minimum the BAS system requires software upgrade, and complete re-commissioning, testing and balancing of all HVAC systems. Complete replacement with a DDC system with current software and functionality by the Owner in the future would be beneficial.

The new BAS should be capable of enabling the facility operator to:

- Schedule the HVAC system to maintain higher/lower temperatures during unoccupied times (Occupied/Unoccupied setback)
- Schedule the toilets, and other exhaust system fans to operate only during occupied times; provide system schedules based on building operational schedule. (365 day Zone Scheduling)
- Control outdoor air dampers based on actual carbon dioxide levels. (Demand Control Ventilation)
- Control of outdoor air dampers to provide economizer cooling vs. mechanical cooling
- Control of discharge air temperature based on actual internal loads (Discharge Air Reset)
- Control hot water system temperature based on outside temperature (Hot Water Reset)
- Prioritize HVAC systems start-up time to reduce peak demand (Demand Load Shedding)
- Control the start/ stop times and temperatures to match actual heat gain/loss that the building experiences based on outdoor temperature (Optimum Start/Stop)
- Monitor energy consumption of equipment
- Add occupancy sensors to control UV operation in all classrooms (unit fans turned off and outside air dampers closed when room is unoccupied, temperature is maintained per DDC setpoint

Additional benefits of this system are that it can provide useful trending information to the owner such as daily, monthly and seasonal energy usage, and also provide alarm messages to the facilities operator via the internet indicating that a piece of equipment needs repair or maintenance. The BAS should also allow the facility to monitor the energy consuming equipment in the building remotely in real-time, track the facility energy performance, and remotely adjust setpoints and schedules to optimize the facility operation. Full color graphics and logical programming functions should also be provided.

The annual electrical and natural gas consumption is taken from the utility bills. Per the U.S. Energy Information Administration the percent of a buildings cooling and heating is 26% and 82%, respectively. Utilizing these numbers, the annual electrical and natural gas usage was found; based on project experience retro-commissioning produces a 10% energy savings.

Commissioning can have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 219,780 kWh, 34,740 therms and $66,600. It is also noted that to continue to gain this annual savings proper maintenance of equipment needs to take place.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-8 HVAC Building Automation System Upgrade/Recommissioning

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
34,800	12,210	0	1,930	3,700	0	3,700	0.9	0	9.4	9.4

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.9 ECM-9 CoolTrol Walk-in Controls

The elementary school contains a 6’x10’ walk-in cooler and 6’x10’ walk-in freezer.

These units currently do not have any control on them and run continuously throughout the day. Installation of a CoolTrol® Cooler Control System was assessed. The evaporator fans run 25% to 80% less, saving electricity and reducing compressor run time, and the door and frame heaters are controlled based on space dewpoint, reducing run time by up to 95% in coolers and 60% in freezers.

CoolTrol controls have an expected life of 18 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 91,260 kWh and $12,600.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as follows:

ECM-9 CoolTrol Walk-in Controls

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
15,000	5,070	0	0	700	0	700	(0.1)	0	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.10 ECM-10 Variable Speed Kitchen Hood Controllers

The kitchen contains a 10'x4' cooking hood with a constant volume 3.0 HP exhaust fan motor. Installation of a variable speed kitchen hood controller to reduce run time of the exhaust fan was assessed.

Upon activation, the hood lights turn on and the fans reach a preset minimum speed of between 10% and 50%. When cooking appliances turn on, the fan speed increases based on exhaust air temperature. During actual cooking, the speed increases to 100% until smoke and heat are removed.

Reducing exhaust and make-up fan speed results in decreased energy consumption. Reducing the supply of summer hot, humid make-up air during idle cooking periods will increase occupant comfort. The system and equipment can also act as an economizer when indoor and outdoor conditions are appropriate for free cooling. In addition, the controls reduce hood noise in the kitchen by up to 90% when the fans slow down. The controls can improve fire safety by monitoring the exhaust air temperature. If the temperature approaches the fusible link rating of the fire suppression system, an alarm can sound and/or the cooking appliances are shut down. This system should also be integrated into the upgraded and re-commissioned BAS. Energy savings are calculated from reduction of exhaust and make-up fan speed.

Kitchen hood controls have an expected life of 18 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 85,320 kWh and $12,600.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-10 Variable Speed Kitchen Hood Controllers

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
34,600	4,740	0	0	700	0	700	(0.6)	0	>20	>20

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.11 ECM-11 Replace Electric Commercial Kitchen Equipment with Natural Gas Equipment

The elementary school contains a commercial cafeteria kitchen with a double stack oven, food warmer and a tabletop kettle cooker. This equipment consumes approximately 100 kW during the six hours of kitchen operation each school day.

The assumption of this calculation is that the operating hours and electrical power consumption of the existing electrical equipment are replaced with newer, more efficient equipment using natural gas. The savings are compared to the cost of new gas kitchen equipment, and the connection cost (if any) to the natural gas utility. The difference in utility usage cost between electricity and natural gas are the savings.

Commercial kitchen equipment has an expected life of 15 years, according to the manufacturer; total energy savings over the life of the project are estimated at 1,198,650 kWh and $135,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-11 Replace Electric Kitchen Equipment with Natural Gas Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric kWh	Electric kW	Nat Gas Therms	Total $						
$					$	$		$	Years	Years
38,900	79,910	0	-2,730	9,000	0	9,000	2.5	0	4.3	4.3

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.12 ECM-12 Lighting Replacement Upgrades

The classrooms and occupied spaces have upgraded to electronic ballast and utilize mainly 4 foot 32 W T-8 fluorescent bulbs; U-tube T-8s, and 2 foot T-8s are also used in other fixtures. Can lights and surface mounted standard bulb fixtures use biaxial compact fluorescent lamps to replace original incandescent bulbs. A fluorescent lamp converts electrical power into useful light more efficiently than an incandescent lamp or the T-12 bulbs found in some facilities. A comprehensive fixture survey was conducted of the entire building. Each switch and circuit was identified, and the number of fixtures, locations, and existing wattage established (Appendix C). There is an opportunity to continue to reduce consumption by upgrading the classrooms to super T-8 fixtures, and the metal halides in the high bay areas to an induction fixture.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to estimated times of operation. The difference between energy requirements resulted in a total annual savings of 49,150 kWh with an electrical demand reduction of about 20 kW. Supporting calculations, including assumptions for lighting hours and annual energy usage for each fixture, are provided in Appendix C.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 737,250 kWh and $112,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-12 Lighting Replacement Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
101,100	49,150	20	0	7,500	0	7,500	0.1	18,625	13.5	11.0

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-14.

4.13 ECM-13 Lighting Controls Installation (Occupancy Sensors)

Lighting is controlled by manual switches. Lights are generally turned on in the morning and shut off at night. During occupied times, there are rooms that are not occupied; however, the lights remain on. Adding occupancy controls to the individual rooms will automatically control the lights based on actual occupancy. The occupancy sensor can be wall mounted near the switch or placed at the ceiling for larger room coverage. All occupancy sensors are equipped with a manual override feature. These sensors are generally not recommended in public toilet rooms.

Lighting controls have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 896,100kWh and $132,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-13 Lighting Controls Installation (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
37,000	59,740	0	0	8,800	0	8,800	2.6	4,000	4.2	3.8

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-14.

4.14 ECM-14 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Due to interactive effects, the energy and cost savings for occupancy sensors and lighting upgrades are not cumulative. This measure is a combination of ECM-12 and ECM-13 to reflect actual expected energy and demand reduction.

The lighting retrofits and controls have an expected lifetime of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 1,444,500 kWh and $192,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-14 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
138,100	96,300	20	0	12,800	0	12,800	0.4	22,625	10.8	9.0

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.15 System Improvement Opportunities

The following item can be implemented by the owner to provide energy savings:

There are two vending machines in the school. As an energy saving opportunity, it is recommended that a vending miser be added to each unit. It is also recommended that if the machines are vendor owned, they be upgraded or removed if not high efficiency equipment.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The facility will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects applied to facilities whose demand in any of the preceding 12 months exceeds 100 kW. This average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations, however. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP).

- Incentive Amount: $0.10/SF
- Minimum incentive: $5,000
- Maximum Incentive: $50,000 or 50% of Facility annual energy cost

The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy savings as determined in Incentive #1 (Minimum 15% savings must be achieved), and is paid upon successful installation of recommended measures.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

Incentive cap: 25% of total project cost

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved

Incentives #2 and #3 can be combined to yield additive savings.

Under incentive #1 of the New Jersey Pay for Performance Program, the 69,607 square foot middle school building is eligible for about $9,430 toward development of an Energy Reduction Plan. The current ECM's meet the minimum savings of 15% and therefore the building would be eligible for incentives #2 and #3. In total, incentives through the NJ P4P program are expected to total about $37,800, reducing the total project payback from 8.3 years to 7.0 years. See Appendix D for calculations.

5.1.2 New Jersey Smart Start Program

For this program, specific incentives for energy conservation measures are calculated on an individual basis utilizing the 2011 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices.

If the complex qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total site energy reduction, and savings will be applied towards the Pay for Performance incentive. A project is not applicable for both New Jersey incentive programs.

5.1.3 Direct Install Program

The Direct Install Program targets small and medium sized facilities where the peak electrical demand does not exceed 150 kW in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies. On a case-by-case basis, the program manager may accept a project for a customer that is within 10% of the 150 kW peak demand threshold.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 70% of the costs for lighting, HVAC, motors, natural gas, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can significantly reduce the implementation cost of energy conservation projects.

The program pays 70% of each project cost up to $75,000 per electrical utility account; total funding for each year is capped at $250,000 per customer. Installations must be completed by a Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website at http://www.njcleanenergy.com. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this document.

The facility is potentially eligible to receive funding from the Direct Install Program. The total estimated implementation cost for ECMs potentially eligible for Direct Install funding is $452,900; the total potential amount funded through Direct Install program is estimated to be $572,400. This includes demand control ventilation, temperature setback, premium efficiency motors and upgrades to the lighting system. The program normally has a potential to pay 70% of the initial costs, leaving 30% to be paid out of pocket. However, funding is capped at $250,000 so that would be the maximum amount available.

Direct Install funding has the potential to significantly reduce the payback period of Energy Conservation Measures.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Solar

6.1.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof does not have sufficient *continuous* roof area to install a large solar cell array and the building orientation is not optimal. Portions of the rooftop structure are wooden, so there may be structural issues; and all rooftop areas need to be replaced in the near future. It is not recommended to install a permanent PV array at this time.

6.1.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, another fluid, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by gas-fired water heaters and, therefore, this measure would offer natural gas utility savings.

Currently, an incentive is not available for installation of thermal solar systems; a Federal tax credit of 30% of installation cost for the thermal applications is available. This is not recommended since the facility currently uses natural gas, the building is not occupied year-round, and domestic hot water demand is not excessive.

6.2 Demand Response Curtailment

Presently, electricity is delivered by Atlantic City Electric, which receives the electricity from regional power grid RFC. South Jersey Energy Co. is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand

periods and utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From July 2010 through June 2011, the Upper Regional School District Elementary school had a maximum electricity demand of 141.0 kW and a minimum of 57.0 kW. The monthly average over the observed 12 month period was 119.0 kW.

This measure is not recommended because the facility is not operating year round, and the building does not have back up/emergency generator power.

7.0 EPA PORTFOLIO MANAGER

The EPA Portfolio Manager benchmarking tool was used to assess the building's energy performance. Portfolio Manager provides a Site and Source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft^2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive and Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed ECMs, the Energy Star rating will increase.

The Site EUI is the amount of heat and electricity consumed by a building as reflected in utility bills. Site energy may be delivered to a facility in the form of primary energy, which is raw fuel burned to create heat or electricity (such as natural gas or oil), or as secondary energy, which is the product created from a raw fuel (such as electricity or district steam). Site EUI is a measure of a building's annual energy utilization per square foot. Site EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types.

$$\textbf{\textit{Site Energy Intensity}} = \frac{(\textit{Electric Usage in kBtu + Natural Gas in kBtu})}{\textit{Building Square Footage}}$$

To provide an equitable comparison for different buildings with varying proportions of primary and secondary energy consumption, the Portfolio Manager uses the convention of Source EUIs. The source energy also accounts for all losses incurred in production, storage, transmission, and delivery of energy to the site; which provides an equivalent measure for various types of buildings with different energy sources.

$$\textbf{\textit{Source Energy Intensity}} = \frac{(\textit{Electric Usage in kBtu X Site/Source Ratio + Natural Gas in kBtu X Site/Source Ratio})}{\textit{Building Square Footage}}$$

The EPA Score, Site EUI, and Source EUI for Upper Township Elementary school are as follows:

Energy Intensity	Upper RSD Elementary School	National Average
EPA Score	98	50
Site (kBtu/sf/year)	23	52
Source (kBtu/sf/year)	75	171

The Upper Elementary School is considered a lower than average energy consumer by the EPA Portfolio Manager which gives it a higher than average EPA score. For the elementary school qualifies for the Energy Star label because the EPA score is above 75. There are several energy conservation measures recommended in this report, that if implemented will further reduce the energy use intensity and increase the EPA score of the elementary school.

The Portfolio Manager account can be accessed by entering the username and password shown below at the login screen of the Portfolio Manager website (https://www.energystar.gov/istar/pmpam/).

A full EPA Energy Star Portfolio Manager Report is located in Appendix H.

The user name ("*UpperTownshipSchools*") and password ("*ENERGYEFFICIENT2011*") for the building's EPA Portfolio Manager Account has been provided to Laurie A. Ryan, Business Administrator/Board Secretary for the Upper Township School District.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Upper Township Elementary School identified potential ECMs for lighting and control replacement, variable speed drives with high efficiency motors, demand control ventilation, and building management system upgrades. Replacement of domestic hot water heaters and replacing electric kitchen gas equipment with natural gas were also evaluated. Potential annual savings of $31,500 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-2 Replace Domestic Water Heater (DWH)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
23,600	24,610	0	-810	2,800	0	2,800	0.4	600	8.4	8.2

* Incentive shown is per the New Jersey SmartStart Program. See section 5.0 for other incentive opportunities.

ECM-3 HVAC Install Variable Speed Drives, High Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
22,500	15,360	0	0	2,300	0	2,300	1.0	3,180	9.8	8.4

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

ECM-7 HVAC Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,100	4,470	0	197	900	0	900	2.0	0	5.7	5.7

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

ECM-8 HVAC Building Automation System Upgrade/Recommissioning

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive*	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
34,800	12,210	0	1,930	3,700	0	3,700	0.9	0	9.4	9.4

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

ECM-11 Replace Electric Kitchen Equipment with Natural Gas Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
38,900	79,910	0	-2,730	9,000	0	9,000	2.5	0	4.3	4.3

* Incentive shown is per the New Jersey Smart Start Program. See section 5.0 for other incentive opportunities.

ECM-14 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
138,100	96,300	20	0	12,800	0	12,800	0.4	22,625	10.8	9.0

APPENDIX A

Utility Usage Analysis

APPENDIX B

Equipment Inventory

APPENDIX C

ECM Calculations

APPENDIX D

New Jersey Pay For Performance Incentive Program

APPENDIX E

Photovoltaic (PV) Rooftop Solar Power Generation

APPENDIX F

Solar Thermal Domestic Hot Water Plant

APPENDIX G

EPA Portfolio Manager

APPENDIX A

Utility Usage Analysis

Upper Township School District: Elementary School
Utility Bills: Account Numbers

Account Number	School Building	Location	Type	Notes
36112399997	Elementary School	50 Old Tuckahoe Road	Electricity	part of study
36112599992	Elementary School Modulars	50 Old Tuckahoe Road	Electricity	part of study
10610889993	Elementary School (6) Exterior Lights	50 Old Tuckahoe Road	Electricity	not part of study
40552006609	Elementary School	50 Old Tuckahoe Road	Gas	part of study

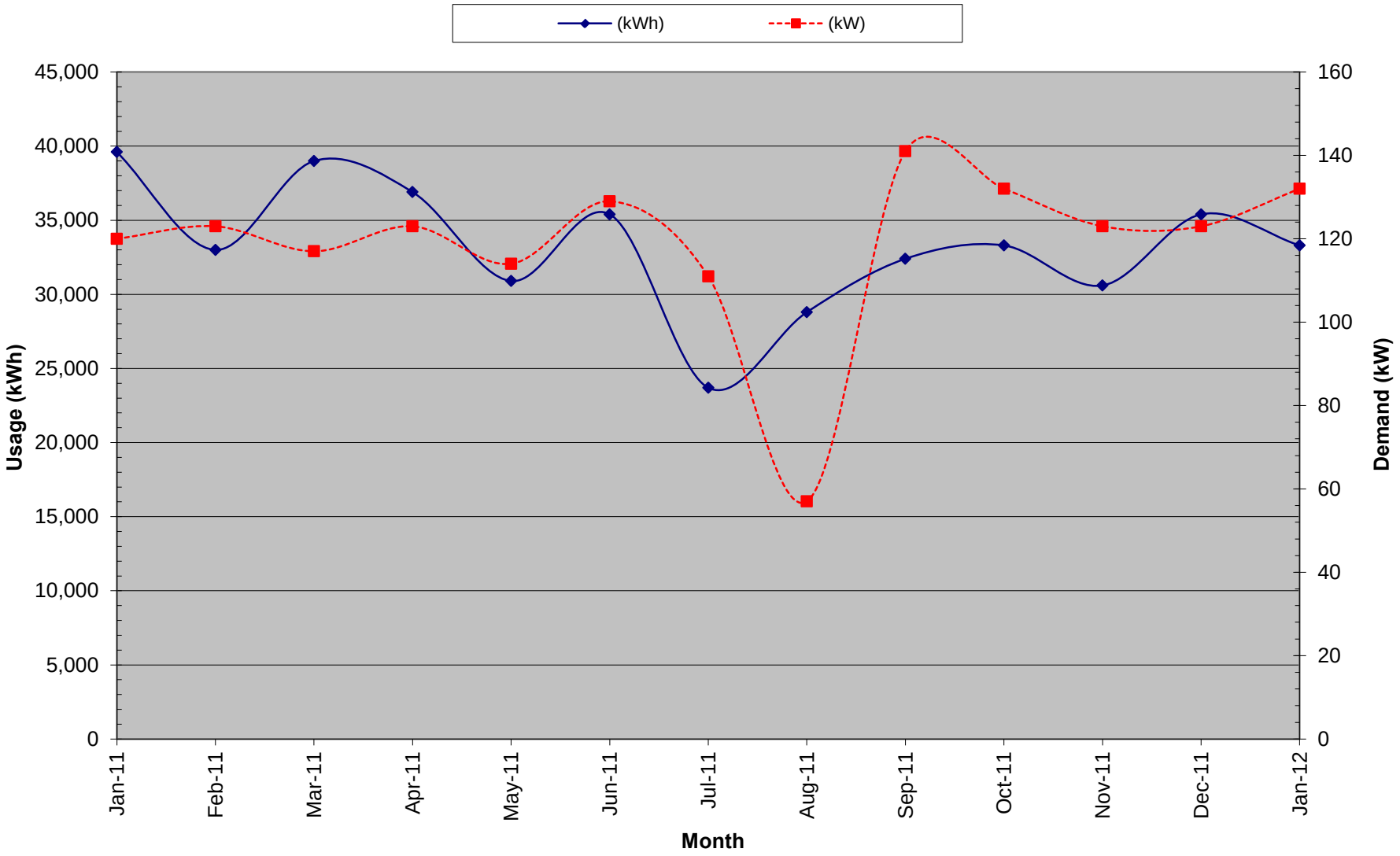
Upper Township School District
Billing Address: 50 Old Tuckahoe Road
Woodbine NJ 08270

Electric Service
Delivery - Atlantic City Electric
Supplier - SJ Energy Co.

For Service at: **Elementary School**
Account No.: **36112399997**
Meter No.: **19526742**

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Delivery ($)	Supply ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
December-10	39,600	120.00	$5,976.10	$1,807.80	$4,168.30	$ 0.151	$ 0.128	$ 7.68
January-11	33,000	123.00	$5,150.66	$1,677.08	$3,473.58	$ 0.156	$ 0.133	$ 6.30
February-11	39,000	117.00	$5,965.14	$1,860.00	$4,105.14	$ 0.048	$ 0.027	$ 6.80
March-11	36,900	123.00	$5,695.42	$1,811.33	$3,884.09	$ 0.154	$ 0.133	$ 6.53
April-11	30,900	114.00	$4,402.21	$1,673.54	$2,728.67	$ 0.142	$ 0.116	$ 7.27
May-11	35,400	129.00	$5,036.12	$1,817.91	$3,218.21	$ 0.142	$ 0.118	$ 6.72
June-11	23,700	111.00	$3,730.05	$1,360.05	$2,370.00	$ 0.157	$ 0.125	$ 6.84
July-11	28,800	57.00	$4,095.13	$1,476.92	$2,618.21	$ 0.142	$ 0.117	$ 12.93
August-11	32,400	141.00	$4,783.82	$1,838.34	$2,945.48	$ 0.148	$ 0.118	$ 6.87
September-11	33,300	132.00	$4,844.10	$1,816.80	$3,027.30	$ 0.145	$ 0.117	$ 7.14
October-11	30,600	123.00	$4,338.88	$1,557.03	$2,781.85	$ 0.142	$ 0.116	$ 6.30
November-11	35,400	123.00	$4,962.59	$1,744.38	$3,218.21	$ 0.140	$ 0.117	$ 6.75
December-11	33,300	132.00	$4,883.11	$1,855.81	$3,027.30	$ 0.147	$ 0.117	$ 7.59
January-12	37,200	120.00	$5,088.13	$1,706.28	$3,381.85	$ 0.137	$ 0.116	$ 6.32
Total (All)	**469,500**	**141.00**	**$68,951.46**	**$24,003.27**	**$44,948.19**	**$ 0.147**	**$ 0.113**	**$ 7.07**

Electric Usage - Elementary School: 36112399997



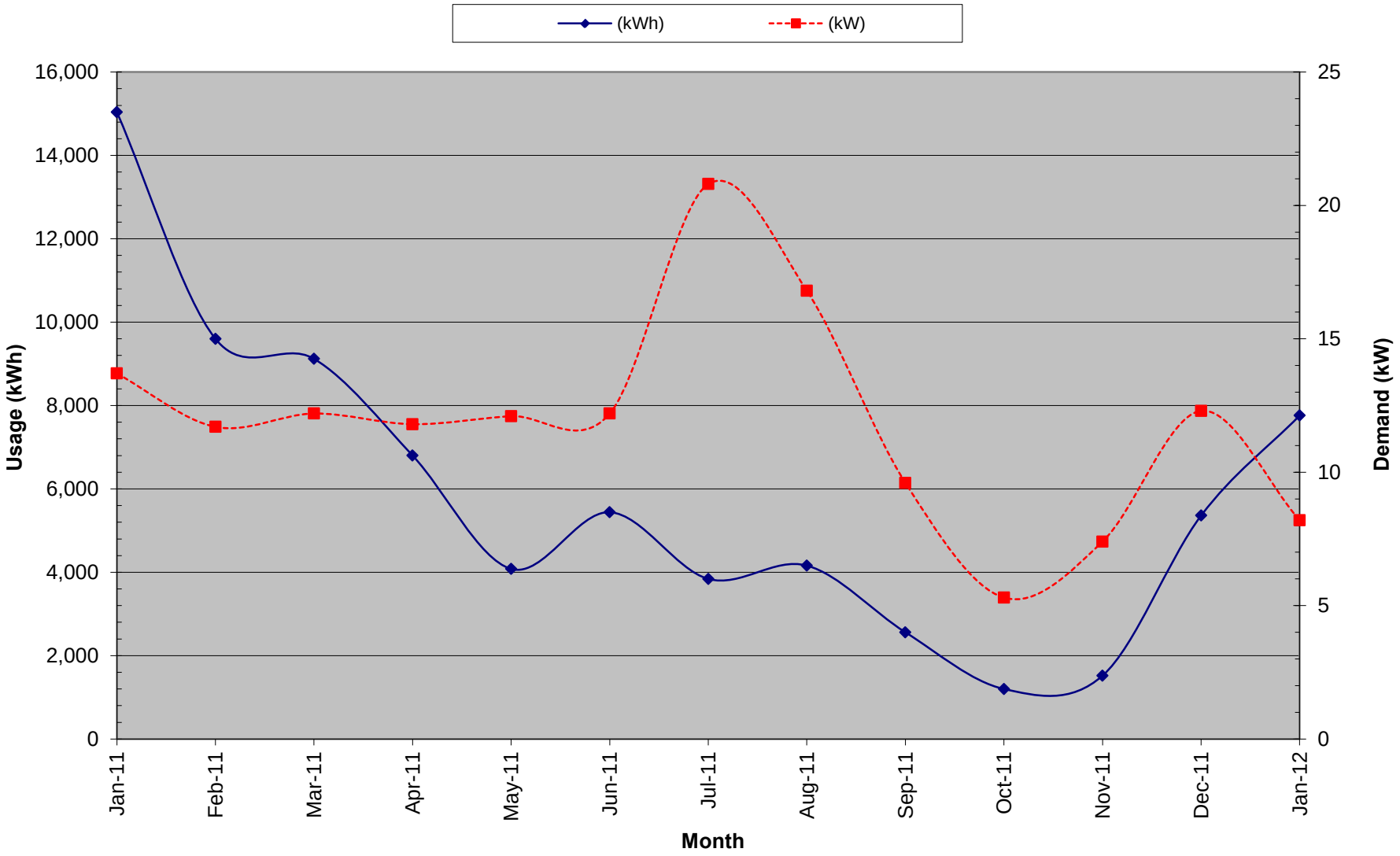
Upper Township School District
Billing Address: 50 Old Tuckahoe Road
Woodbine NJ 08270

Electric Service
Delivery - Atlantic City Electric
Supplier - SJ Energy Co.

For Service at: **Elementary School Modulars**
Account No.: **3611259992**
Meter No.: **105741189/74452524**

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Delivery ($)	Supply ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
December-10	15,040	13.70	$ 2,352.94	$ 725.91	$ 1,627.03	$ 0.16	$ 0.15	$ 4.09
January-11	9,600	11.70	$ 1,553.44	$ 514.91	$ 1,038.53	$ 0.16	$ 0.16	$ 3.28
February-11	9,120	12.20	$ 1,483.28	$ 496.68	$ 986.60	$ 0.16	$ 0.16	$ 3.54
March-11	6,800	11.80	$ 1,115.48	$ 379.86	$ 735.62	$ 0.16	$ 0.16	$ 3.32
April-11	4,080	12.10	$ 631.53	$ 252.91	$ 378.62	$ 0.15	$ 0.14	$ 3.77
May-11	5,440	12.20	$ 832.92	$ 328.09	$ 504.83	$ 0.15	$ 0.14	$ 3.88
June-11	3,840	20.80	$ 684.70	$ 300.70	$ 384.00	$ 0.18	$ 0.15	$ 4.55
July-11	4,160	16.80	$ 685.85	$ 299.80	$ 386.05	$ 0.16	$ 0.15	$ 4.58
August-11	2,560	9.60	$ 417.96	$ 180.39	$ 237.57	$ 0.16	$ 0.15	$ 4.13
September-11	1,200	5.30	$ 195.30	$ 83.94	$ 111.36	$ 0.16	$ 0.15	$ 3.15
October-11	1,520	7.40	$ 241.17	$ 100.11	$ 141.06	$ 0.16	$ 0.14	$ 2.95
November-11	5,360	12.30	$ 804.03	$ 306.62	$ 497.41	$ 0.15	$ 0.14	$ 3.66
December-11	7,760	8.20	$ 1,122.31	$ 402.18	$ 720.13	$ 0.14	$ 0.14	$ 3.58
January-12	10,000	7.90	$ 1,425.20	$ 497.20	$ 928.00	$ 0.14	$ 0.14	$ 3.01
Total (All)	**86,480**	**20.80**	**$13,546.11**	**$4,869.30**	**$8,676.81**	**$ 0.157**	**$ 0.149**	**$ 3.81**

Electric Usage - Elementary School: 3611259992

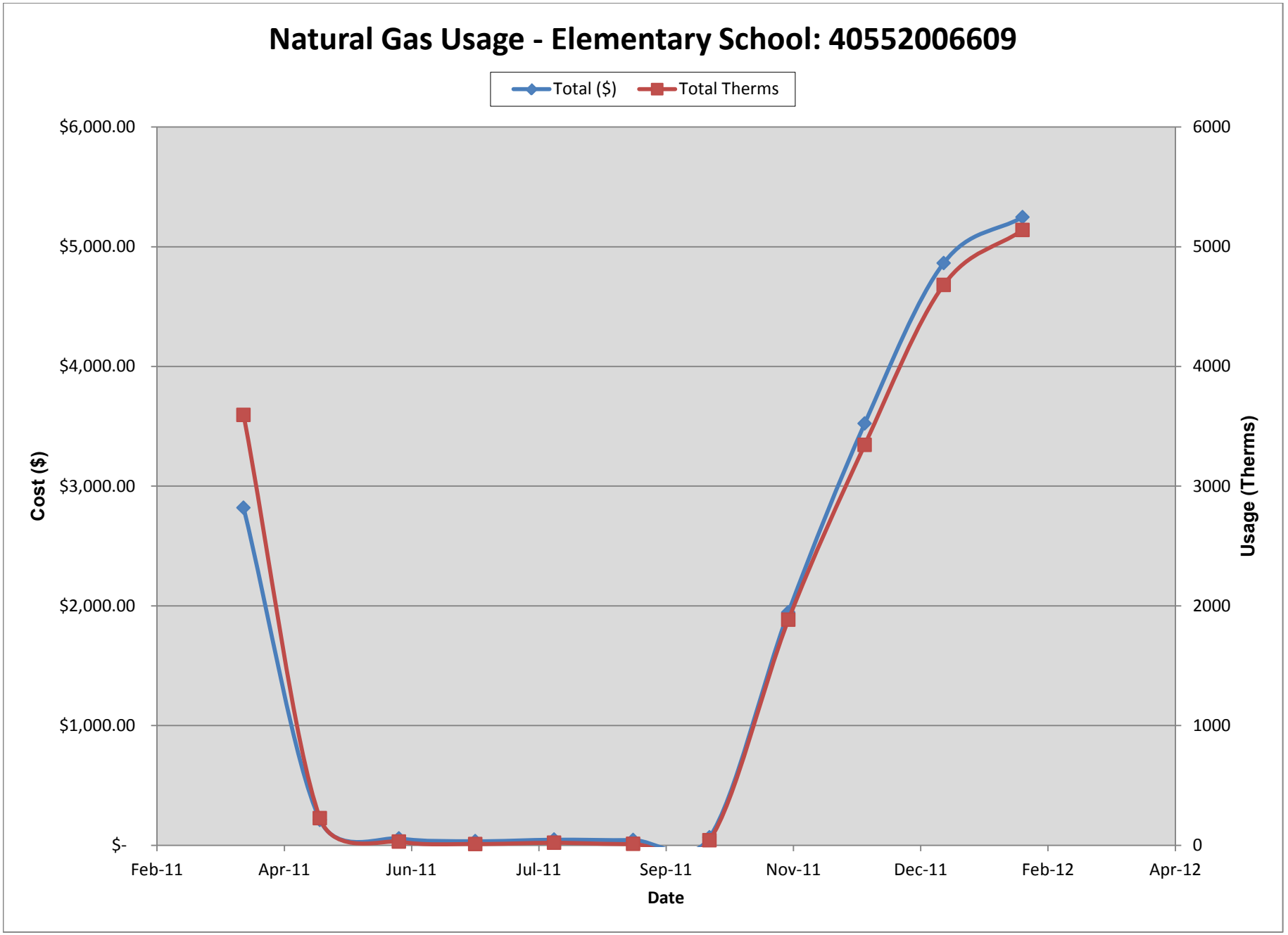


Upper Township School District
Billing Address: 50 Old Tuckahoe Road
Woodbine NJ 08270

Gas Service
Delivery - South Jersey Gas
Supplier - na

For Service at: Elementary School
Account No.: 40552006609
Meter No.: 497746

Month	Total ($)	Delivery ($)	Supply ($)	Total Therms	$/Therm
Mar-11	$ 2,819.13	$ 1,851.91	$ 967.22	3594.5	$ 0.78
Apr-11	$ 211.01	$ 141.14	$ 69.87	225.94	$ 0.93
May-11	$ 57.36	$ 39.60	$ 17.76	31.02	$ 1.85
Jun-11	$ 33.44	$ 27.50	$ 5.94	10.38	$ 3.22
Jul-11	$ 46.24	$ 34.36	$ 11.88	20.74	$ 2.23
Aug-11	$ 43.43	$ 32.27	$ 11.16	10.41	$ 4.17
Sep-11	$ 65.01	$ 43.74	$ 21.27	41.32	$ 1.57
Oct-11	$ 1,946.13	$ 953.13	$ 993.00	1883.07	$ 1.03
Nov-11	$ 3,523.76	$ 1,678.06	$ 1,845.70	3345.21	$ 1.05
Dec-11	$ 4,863.44	$ 2,324.01	$ 2,539.43	4680.74	$ 1.04
Jan-12	$ 5,247.80	$ 2,532.09	$ 2,715.71	5139.36	$ 1.02
Feb-12	$ 4,627.99	$ 2,266.62	$ 2,361.37	4596.85	$ 1.01
Total	**$ 23,484.74**	**$ 11,924.43**	**$ 11,560.31**	**23579.54**	**$ 1.00**


Natural Gas Usage - Elementary School: 40552006609
Total ($)
Total Therms
$6,000.00
$5,000.00
$4,000.00
$3,000.00
$2,000.00
$1,000.00
$-
Cost ($)
6000
5000
4000
3000
2000
1000
0
Usage (Therms)
Feb-11
Apr-11
Jun-11
Jul-11
Sep-11
Nov-11
Dec-11
Feb-12
Apr-12
Date

APPENDIX B

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #24145
Upper Township School District
Elementary School Building
Original Construction Date: 1952
Renovation/Addtion Date: 1963 (Rooms 14 thru 22)
Modular Trailers Added: 1967
Renovation/Addtion Date: 1986 (Library thru Room 50)

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/ Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
Heating Hot Water Boilers	2	HB Smith	Boiler No. 1,2: 350MILS Boiler	Boiler No.1: 4038H2 Boiler No.2: 4039H2	Heating / No. 2 Fuel Oil	2,835,000 Btuh Input, 1,947,800 Btuh Output, Natural Gas / 69.7% Eff.	Boiler Room	Elementary School	1953	-24	Cast iron sectional boilwer with factory burner; Good Condition
Heating Hot Water Pumps	2	Thrush Products	P-1 & P-2: 2X2 1/2X9 PF2G	P-1: 29775A P-2: 29775B	Primary Loop Pump / Electric	5.0 HP / 1,750 RPM / Standard Eff., 85.5%	Boiler Room	Constant Volume HHW loop / 1952 & 1963 Building Areas	1952	-40	Poor Condition
Heating Hot Water Pumps	1	Armstrong	NOT AVAILABLE	P-3: NOT AVIALABLE	Primary Loop Pump / Electric	3.0 HP / 1,730 RPM / High Eff., 81.5%	Boiler Room	Constant Volume HHW loop / 1986 Building Areas	1986	-6	Poor Condition
Domestic Hot Water Heater	1	Bradford White	MI-40S6DS13	SH2741079	Domestic Hot Water Heating / Electric	40 Gallon / 4500 Watts	Mechanical Room 45	Rooms 16 thru 49	1986	-14	Fair Condition
Domestic Hot Water Heater	1	Bradford White	MI-75S5CN-66DS13	GK9114253	Domestic Hot Water Heating / Natural Gas	75 Gallon / 75,000 Btuh / 80% Eff.	Boiler Room	Rooms 1 thru 13, 35,49, Cafeteria & Main Office	1989	-11	Fair Condition
Domestic Hot Water Heater	1	State Industries	SSX 120 1RT3 JW	F86812464	Domestic Hot Water Heating / Electric	120 Gallons / 5500 Watts	Kitchen Dry Storage	Kitchen	1986	-14	Fair Condition
Domestic Hot Water Heaters	2	State Industries	SSX 120 1RT3 JW	F86812462 & F86812463	Domestic Hot Water Heating / Electric	120 Gallons / 5500 Watts	Gym Storage / Mech Room	Gym Bathrooms & Lockers	1986	-14	Fair Condition
HV-1	1	Trane	NOT AVAILABLE	NOT AVAILABLE	HVAC / Ventilation, Hot Water Heating	11,500 CFM / HTG: 500 MBH / 7.5 HP SF	Rooftop Above Area Served	Gym	1963	-34	Poor Condition; no information or drawings available; equipment details estimated based on casing size.
FCU-1 / CU-1	1	Arcoaire By Intercity Products, Inc.	Indoor: BYMCO18-024GA Outdoor: AD024G0	Indoor: R921300679 Outdoor: L920243303	HVAC Vertical FCU / DX Electric Cooling	600 CFM / CLG: 18 MBH / 1/5 HP SF	Inside Area Served; Condensing Unit Outside On Grade	FCU Inside Computer Lab Room 28 & CU Outside On Grade Beside Room	1986	-11	FCU: Fair Condition CU: Poor Condition
AC-1	1	Trane	BTD736A100B0	S16205932	HVAC / DX Electric Cooling	1200 CFM / CLG: 36 MBH / 1/2 HP SF	Rooftop Above Area Served	Not Working	1986	-11	Poor Condition
AC-2	1	Trane	TTR036C100A0	H19237462	HVAC / DX Electric Cooling	1200 CFM / CLG: 36 MBH / 1/2 HP SF	Rooftop Above Area Served	Library Room 32	1993	-4	Good Condition
AC-3	1	Trane	BTD736A100B0	S16205951	HVAC / DX Electric Cooling	1200 CFM / CLG: 36 MBH / 1/2 HP SF	Rooftop Above Area Served	Not Working	1986	-11	Poor Condition

New Jersey BPU Energy Audit Program
CHA #24145
Upper Township School District
Elementary School Building
Original Construction Date: 1952
Renovation/Addtion Date: 1963 (Rooms 14 thru 22)
Modular Trailers Added: 1967
Renovation/Addtion Date: 1986 (Library thru Room 50)

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/ Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
AC-4	1	Trane	TTB03C100A0	L194KPNBF	HVAC / DX Electric Cooling	850 CFM / CLG: 30 MBH / 1/3 HP SF	Rooftop Above Area Served	Room 50	1996	-1	Good Condition
Window Units	4	Friedrich & Other Various Brands	CP Series, & Various Older Units	NOT AVAILABLE	HVAC / Electric DX Cooling Window Unit	18 MBH / Fractional HP fan motors / Various EER Ratings	Exterior Wall Windows	Classrooms	1990	-2	GoodCondition
Window Units	29	Friedrich & Other Various Brands	CP Series, & Various Older Units	NOT AVAILABLE	HVAC / Electric DX Cooling Window Unit	12.5 MBH / Fractional HP fan motors / Various EER Ratings	Exterior Wall Windows	Classrooms	1990	-2	GoodCondition
UV	34	Nesbitt	NOT AVAILABLE	NOT AVAILABLE	HVAC / Ventilation, Hot Water Heating	Fractional HP fan motors, max size 1/8 HP	Vertical unit ventilator floor mounted cabinet	Classrooms With Exterior Walls	1963	-29	Fair Condition
UV	1	Nesbitt	NOT AVAILABLE	NOT AVAILABLE	HVAC / Ventilation, Hot Water Heating	Fractional HP fan motor, max size 1/8 HP	Horizontal unit ventilator ceiling mounted cabinet	Art Room 21	1963	-29	Fair Condition
CH	6	NOT AVAILABLE	Ceiling Recessed Models	NOT AVAILABLE	HVAC / Hot Water Heating	Fractional HP fan motors, max size 1/4 HP	Horizontal cabinet heaters, ceiling mounted	Corridors & Vestibules In 1986 Addition	1963	-29	Good Condition
FTR	37	NOT AVAILABLE	NOT AVAILABLE	NOT AVAILABLE	HVAC / Hot Water Heating	1/4" tube size, 32 fins/inch, 180°F HWS & 1000 BTU/hr/ft	Horizontal fin tube radiation, lower walls	Corridors, Entrance Vestibules and Toilets in 1952 Areas	1998	6	Good Condition
Kitchen: Walk-in Cooler	1	Harford Systems, Inc.	-	-	6'x10' Walk-in Cooler / Electric DX	-	Kitchen	-	-	-	Good Condition
Kitchen: Walk-in Freezer	1	Harford Systems, Inc.	-	-	6'x10' Walk-in Cooler / Electric DX	-	Kitchen	-	-	-	Good Condition
Kitchen: Cooking Exhaust Hood	1	-		-	4'x10' Cooking Exhaust Hood / Electric Ventilation Fan	3 HP EF / Std. Eff.	Kitchen	-	-	-	Good Condition
Kitchen: Dishwasher	1	Insinger	AJ44CE	-	Appliance / Hot Water	-	Kitchen	-	-	-	Good Condition
Kitchen: Steamer	1	Groen	-	-	2-Box Table Top Steamer / Appliance / Electric	18 Kw	Kitchen	-	-	-	Good Condition
Kitchen: Kettle	1	Groen	-	-	Table Top, 3 Gallon Kettle / Appliance / Electric	8.4 Kw	Kitchen	-	-	-	Good Condition
Kitchen: Double Stack Oven	1	Garland	-	-	Commercial 2-stack, 4 shelves Each Oven / Appliance / Electric	42 Kw	Kitchen	-	-	-	Good Condition

New Jersey BPU Energy Audit Program
CHA #24145
Upper Township School District
Elementary School Building
Original Construction Date: 1952
Renovation/Addtion Date: 1963 (Rooms 14 thru 22)
Modular Trailers Added: 1967
Renovation/Addtion Date: 1986 (Library thru Room 50)

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/ Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
Kitchen: Food Warmer	1	Traulsen	-	-	Commercial Single Section 3'x6' Hot Box / Appliance / Electric	1.5 Kw	Kitchen	-	-	-	Good Condition
Kitchen: Steam Serving Table	1	-	-	-	Appliance / Electric	2.8 Kw	Kitchen	-	-	-	Good Condition
Kitchen: Cooler	1	Traulsen	-	-	Commercial Doulbe Single Section 6'x6' Cooler / Appliance / Electric	0.9 Kw	Kitchen	-	-	-	Good Condition
Vending Machines	2	-	NOT AVAILABLE	NOT AVAILABLE	Vending / Electric DX	-	Refrigerated Soda Vending Machines with Lighting	Faculty Room & Students Use	-	-	Good Condition
Emergency Generator	1	Onan	150 Genset	NOT AVAILABLE	Emergency Power / No. 2 Fuel Oil	150 Kw / 280 Gallon Fuel Tank	Outside On Grade Behind Cafeteria Kitchen	Emergency Lights, Life Safety Systems & Security/Access Control Systems	-	-	Good Condition

APPENDIX C

ECM Calculations

Summary of Energy Conservation Measures							
Energy Conservation Measure		**Approx. Costs ($)**	**Approx. Savings ($/year)**	**Payback (Years) w/o Incentive**	**Potential Incentive ($)***	**Payback (Years) w/ Incentive**	**Recommended For Implementation**
ECM-1	HVAC Condensing Boilers Addition	148,400	2,100	70.7	6,000	67.8	
ECM-2	Replace Domestic Water Heater (DWH)	23,600	2,800	8.4	600	8.2	X
ECM-3	HVAC Install Variable Speed Drives, High Efficiency Motors	22,500	2,300	9.8	3,180	8.4	X
ECM-4	HVAC Air Handling Equipment Replacement	64,500	0	366796.8	1,950	355707.5	
ECM-5	Replace Window A/C Units with Energy Star Units	8,500	300	28.3	2,145	21.2	
ECM-6	HVAC DX Split Systems Replacement	37,600	100	376.0	1,300	363.0	
ECM-7	HVAC Demand Control Ventilation	5,100	900	5.7	0	5.7	X
ECM-8	HVAC Building Automation System Upgrade/Re-commissioning	34,800	3,700	9.4	0	9.4	X
ECM-9	CoolTrol Walk-in Controls	15,000	700	21.4	0	21.4	
ECM-10	Variable Speed Kitchen Hood Controllers	34,600	700	49.4	0	49.4	
ECM-11	Replace Electric Kitchen Equipment with Natural Gas Equipment	38,900	9,000	4.3	0	4.3	X
ECM-12	Lighting Replacement Upgrades	101,100	7,500	13.5	18,625	11.0	X
ECM-13	Lighting Controls Installation (Occupancy Sensors)	37,000	8,800	4.2	4,000	3.8	X
ECM-14	Lighting Replacements with Lighting Controls (Occupancy Sensors)	138,100	12,800	10.8	22,625	9.0	X

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM Summary Sheet

ECM-1 HVAC Condensing Boilers Addition

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
148,400	0	0	2,070	2,100	0	2,100	(0.7)	6,000	>20	>20

ECM-2 Replace Domestic Water Heater (DWH)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
23,600	24,610	0	-810	2,800	0	2,800	0.4	600	8.4	8.2

ECM-3 HVAC Install Variable Speed Drives, High Efficiency Motors

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
22,500	15,360	0	0	2,300	0	2,300	1.0	3,180	9.8	8.4

ECM-4 HVAC Air Handling Equipment Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
64,500	1	0	0	0	0	0	(1.0)	1,950	>20	>20

ECM-5 Replace Window A/C Units with Energy Star Units

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
8,500	1,730	0	0	300	0	300	(0.6)	2,145	>20	>20

ECM-6 HVAC DX Split Systems Replacement

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
37,600	1,010	0	0	100	0	100	(0.9)	1,300	>20	>20

ECM-7 HVAC Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
5,100	4,470	0	197	900	0	900	2.0	0	5.7	5.7

ECM-8 HVAC Building Automation System Upgrade/Re-commissioning

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
34,800	12,210	0	1,930	3,700	0	3,700	0.9	0	9.4	9.4

ECM-9 CoolTrol Walk-in Controls

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
15,000	5,070	0	0	700	0	700	(0.1)	0	>20	>20

ECM-10 Variable Speed Kitchen Hood Controllers

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
34,600	4,740	0	0	700	0	700	(0.6)	0	>20	>20

ECM-11 Replace Electric Kitchen Equipment with Natural Gas Equipment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
38,900	79,910	0	-2,730	9,000	0	9,000	2.5	0	4.3	4.3

ECM-12 Lighting Replacement Upgrades

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
101,100	49,150	20	0	7,500	0	7,500	0.1	18,625	13.5	11.0

ECM-13 Lighting Controls Installation (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
37,000	59,740	0	0	8,800	0	8,800	2.6	4,000	4.2	3.8

ECM-14 Lighting Replacements with Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Incentive *	Payback (without incentive)	Payback (with incentive)
	Electric	Electric	Nat Gas	Total						
$	kWh	kW	Therms	$	$	$		$	Years	Years
138,100	96,300	20	0	12,800	0	12,800	0.4	22,625	10.8	9.0

Upper Township School District - NJBPU
CHA Project #24145

Utility Costs		Yearly Usage	MTCDE
$ 0.147	$/kWh blended		0.00042021
$ 0.113	$/kWh consumpti	469,500	0.00042021
$ 7.07	$/kW	141	0
$ 1.00	$/Therm	23,579	0.00533471
$ -	$/kgals	-	0

Upper Township Elementary School

	Item	Savings						Cost	Simple Payback	MTCDE	Life Expectancy
		kW	kWh	therms	cooling kWh	kgal/yr	$				
ECM-1	HVAC Condensing Boilers Addition	0.0	0	2,069	0	0	$ 2,100	$ 148,400	70.7	11.0	25
ECM-2	Replace Domestic Water Heater (DWH)	0.0	24,610	-809	0	0	$ 2,800	$ 23,600	8.4	6.0	12
ECM-3	HVAC Install Variable Speed Drives, High Efficiency Motors	0.0	15,364	0	0	0	$ 2,300	$ 22,500	9.8	6.5	20
ECM-4	HVAC Air Handling Equipment Replacement	0.0	1	0	0	0	$ 0	$ 64,500	366,797	0.0	15
ECM-5	Replace Window A/C Units with Energy Star Units	0.0	1,727	0	0	0	$ 300	$ 8,500	28.3	0.7	15
ECM-6	HVAC DX Split Systems Replacement	0.0	1,013	0	0	0	$ 100	$ 37,600	376.0	0.4	15
ECM-7	HVAC Demand Control Ventilation	0.0	4,469	197	0	0	$ 900	$ 5,100	5.7	2.9	18
ECM-8	HVAC Building Automation System Upgrade/Re-commissioning	0.0	12,207	1933.478	0	0	$ 3,700	$ 34,800	9.4	15.4	18
ECM-9	CoolTrol Walk-in Controls	0.0	5,071	0	0	0	$ 700	$ 15,000	21.4	2.1	18
ECM-10	Variable Speed Kitchen Hood Controllers	0.0	4,738	0	0	0	$ 700	$ 34,600	49.4	2.0	18
ECM-11	Replace Electric Kitchen Equipment with Natural Gas Equipment	0.0	79,914	-2,727	0	0	$ 9,000	$ 38,900	4.3	19.0	15
ECM-12	Lighting Replacement Upgrades	23.1	49,151	0	0	0	$ 7,500	$101,100	13.5	20.7	15
ECM-13	Lighting Controls Installation (Occupancy Sensors)	0.0	59,741	0	0	0	$ 8,800	$37,000	4.2	25.1	15
ECM-14	Lighting Replacements with Lighting Controls (Occupancy Sensors)	23.1	96,302	0	0	0	$ 12,800	$138,100	10.8	40.5	15

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-1 Condensing Boilers Added

ECM Description Summary

Two (2) high efficiency natural gas condensing boilers will be added to provide heating hot water for the building during the heating season (October-April), the existing two boilers will be removed due to their age, condition and efficiency. Boilers will be located inside existing boiler room mechanical space.

Existing Fuel Nat.Gas
Proposed Fuel Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 1.00	/ Therm	
Proposed Fuel Cost	$ 1.00	/ Therm	
Baseline Fuel Use	10,116	Therms	Based on historical utility data.
Existing Boiler Plant Efficiency	70%		Estimated or Measured
Baseline Boiler Load	708,120	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 100 Mbtu/Therms
Baseline Fuel Cost	$ 10,116		
Proposed Boiler Plant Efficiency	88%		New Condensing Boiler Seaonal Efficiency;boilers are ~92% efficient at full load (i.e., during the shoulder months)
Proposed Fuel Use	8,047	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 8,047		
Annual Utility Savings	2,069	Therms	
Annual Savings	$ 2,069		
Boiler Addition Project Cost	$ 148,400		
Simple Payback	72	Years	Negative number indicates

*Note to engineer: Link savings back to summary sheet in appropriate column.

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-1 Condensing Boilers Added - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
2,500 MBH NG Condensing Boiler	2	EA	$ 40,000	$ 2,000		$ 88,000	$ 5,400	$ -	$ 93,400	
Flue Installation	50	LF	$ 75.0	$ 15.00		$ 4,125	$ 1,013	$ -	$ 5,138	
Reprogram DDC system	2	EA	$ 100.0	$ 350.00		$ 220	$ 945	$ -	$ 1,165	
Miscellaneous Electrical	1	LS	$ 500	$ 500		$ 550	$ 675	$ -	$ 1,225	
Miscellaneous HW Piping	1	LS	$ 2,000	$ 1,500		$ 2,200	$ 2,025	$ -	$ 4,225	
Existing boilers demolition	1	LS	$ 500	$ 5,000		$ 550	$ 6,750	$ -	$ 7,300	
						$ -	$ -	$ -	$ -	

$ 112,453	Subtotal
$11,245.25	10% Contingency
$24,739.55	20% Contractor O&P
$ -	0% Engineering
$ 148,400	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-2A: Replace Gas-Fired DHW Heater w/ Condensing Gas-Fired DHW Heater

ECM Summary

During periods of little or no domestic hot water use, domestic hot water heaters must still heat the water within their storage tank. Energy required maintaining the hot water temperature setpoint during times of zero demand is known as standby losses. According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on a tank-type, high efficiency condensing hot water heater.

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	**10.4**	Therms/month	From utility bill for month of September when DHW is primary NG usage
Total Annual Utility Demand by Water Heater	12,492	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	9,994	MBTU/yr	
Existing Tank Size	75	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	10	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	Per building personnel
Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,859	MBTU/yr	
New Tank Size	80	Gallons	Based on AO Smith tank-type high efficiency DHW Heater, (1) 80 gal
Hot Water Piping System Capacity	10	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	˚F	
Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.3	MBH	
Annual Standby Hot Water Load	11,498	MBTU/yr	
Total Annual Hot Water Demand	10,632	MBTU/yr	
Proposed Avg. Hot water heater efficiency	95%		Based on AO Smith tank-type high efficiency DHW Heater
Proposed Fuel Use	112	Therms	Standby Losses and inefficient DHW heater eliminated
Utility Cost	$1.00	$/Therm	
Existing Operating Cost of DHW	$125	$/yr	
Proposed Operating Cost of DHW	$112	$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	13	$13

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-2B: Replace Electric DHW Heater w/ Condensing Gas-Fired DHW Heater

ECM Summary

During periods of little or no domestic hot water use, domestic hot water heaters must still heat the water within their storage tank. Energy required maintaining the hot water temperature setpoint during times of zero demand is known as standby losses. According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on a tank-type, high efficiency condensing hot water heater.

Item	Value	Units	Formula/Comments
Occupied days per week	7	days/wk	
Water supply Temperature	50	˚F	Termperature of water coming into building
Hot Water Temperature	140	˚F	
Hot Water Usage per day	146	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	39,825	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	280	Gallons	Per manufacturer nameplate
Hot Water Temperature	140	˚F	Per building personnel
Average Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	4.1	MBH	
Annual Standby Hot Water Load	35,770	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	75,595	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	90%		Per Manufacturer
Total Annual Energy Required	83,994	Mbtu/yr	
Total Annual Electric Required	**24,610**	**kWh/yr**	**Electrical Savings**
Average Annual Electric Demand	2.81	kW	
Peak Electric Demand	**15.50**	**kW**	**Per Manufacturer's Nameplate (Demand Savings)**
New Tank Size	280	Gallons	(2) 120 gallon and (1) 40 gallon tank-type hot water heaters
Hot Water Temperature	140	˚F	
Average Room Temperature	70	˚F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	4.1	MBH	
Annual Standby Hot Water Load	35,770	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	75,595	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		Based on Navien CR180 instantaneous, condensing DHW Heater
Proposed Total Annual Energy Required	82,168	MBTU/yr	
Proposed Fuel Use	822	Therms/yr	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	$7.07	$/kW	
Elec Utility Supply Unit Cost	$0.11	$/kWh	
NG Utility Unit Cost	$1.00	$/Therm	
Existing Operating Cost of DHW	$4,096	$/yr	
Proposed Operating Cost of DHW	$822	$/yr	
Annual Utility Cost Savings	**$3,274**	**$/yr**	

Daily Hot Water Demand

			#USES PER DAY		FULL TIME OCCUPANTS**				
FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	MALE	FEMALE	MALE	FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY
LAVATORY (Low-Flow Lavs use 0.5 GPM)	2.5	0.25	3	3	30	30	113	50%	56
SHOWER	2.5	5	1	1	2	2	50	75%	38
KITCHEN SINK	2.5	0.5	1	1	5		6	75%	5
MOP SINK	2.5	2	1	1	10		50	75%	38
Dishwasher (gal per u	10	1	1	0	1		10	100%	10
					TOTAL		219		**146**

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.
**These are the occupanct that use the fixtures. If fixture does not exist change to (0).

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-2: Replace Electric & Gas-Fired DHW Heaters w/ Condensing Gas-Fired DHW Heater - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Gas-Fired DHW Heater Removal	1	EA		$ 100		$ -	$ 135	$ -	$ 135	
Electric DHW Heater Removal	3	EA		$ 50		$ -	$ 203	$ -	$ 203	
High Efficiency Gas-Fired 40.0 gallon DHW Heater	1	EA	$ 1,500	$ 280		$ 1,650	$ 378	$ -	$ 2,028	
High Efficiency Gas-Fired 120.0 gallon DHW Heater	2	EA	$ 3,500	$ 280		$ 7,700	$ 756	$ -	$ 8,456	
Miscellaneous Electrical	4	EA	$ 200			$ 880	$ -	$ -	$ 880	
Venting Kit	4	EA	$ 450	$ 650		$ 1,980	$ 3,510	$ -	$ 5,490	
Miscellaneous Piping and Valves	4	LS	$ 150			$ 660	$ -	$ -	$ 660	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 17,852	Subtotal
$ 1,785	10% Contingency
$ 3,927	20% Contractor O&P
$ -	0% Engineering
$ 23,600	**Total**

a

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-3: Install Variable Speed Drives - HW Pump

Variable Inputs

Blended Electric Rate	$0.15
Heating System "On" Point	55
VFD Efficiency	98.5%

ECM Description Summary

Larger motors that operate pumps unnecessarily consume electrical energy. The hot water system pumps operate at a constant speed even though the building load does not require all of the flow to maintain temperatures. By adding speed controllers to the motors, called Variable Frequency Drives (VFD's), and reducing the flow (by slowing the motors down), significant electrical energy can be saved. Pressure actuated controllers are used to measure the water pressure in the hto water system and as valves close, the system pressure increases and in turn the pump speed is reduced.

PUMP SCHEDULE

Pump ID	Qty	HP	Total HP	Existing Motor Motor Eff.	New Motor Motor Eff.	Exist. Motor kW Note 1	New Motor kW Note 2
P-1, P-2	1	5.0	5.0	85.5%	89.5%	3.49	3.33
P-3	1	3.0	3.0	84.0%	89.5%	2.13	2.00
					Total:	5.62	5.33

SAVINGS ANALYSIS

OAT - DB Avg Temp F	OAT - WB Avg Temp F	Annual Hours in Bin	Heating Hours Bin	Pump Load %	Existing Pump kWh	Proposed Pump kW	Speed efficiency %	Proposed Pump kWh	Proposed Savings kWh
(A) See Note 3	(B) See Note 3	(C) See Note 3	(D) =IF(A>TP,0,C)	(E) =0.5+0.5* (50-A)/(50-10)) See Note 4	(F) =D*AA	(G) =BB*E^2.5/CC See Note 5	(H)	(I) =D*G	(J) =F-H
97.5	75	0	0	0%	0	0.0	0.0%	0	0
92.5	74	3	0	0%	0	0.0	0.0%	0	0
87.5	72	34	0	0%	0	0.0	0.0%	0	0
82.5	69	131	0	0%	0	0.0	0.0%	0	0
77.5	67	500	0	0%	0	0.0	0.0%	0	0
72.5	64	620	0	0%	0	0.0	0.0%	0	0
67.5	62	664	0	0%	0	0.0	0.0%	0	0
62.5	58	854	0	0%	0	0.0	0.0%	0	0
57.5	53	927	0	0%	0	0.0	0.0%	0	0
52.5	47	600	600	53%	3,373	1.1	84.1%	782	2,591
47.5	43	610	610	58%	3,429	1.4	88.8%	967	2,463
42.5	38	611	611	64%	3,435	1.8	92.7%	1,164	2,271
37.5	34	656	656	69%	3,688	2.2	95.9%	1,489	2,198
32.5	30	1,023	1,023	75%	5,751	2.6	98.2%	2,748	3,002
27.5	25	734	734	81%	4,126	3.2	99.8%	2,321	1,805
22.5	20	334	334	86%	1,878	3.7	100.0%	1,245	633
17.5	16	252	252	92%	1,417	4.4	100.0%	1,098	319
12.5	11	125	125	97%	703	5.0	99.7%	633	70
7.5	6	47	47	100%	264	5.4	99.0%	257	7
2.5	2	22	22	100%	124	5.4	99.0%	120	3
-2.5	-3	13	13	100%	73	5.4	99.0%	71	2
-7.5	-8	0	0	0%	0	0.0	0.0%	0	0
		8,760	5,027		28,259			12,895	15,364

Notes:

1) Existing motor power based on operation with existing motor efficiency, operating at 80% load factor when at full load. Formula: Motor HP x 0.746 x 0.8 / Exist. Motor Eff., New motor power is based on same formula using the new motor efficiency.
2) New motor power is the same as existing motor power adjusted for the new efficiency, if a new motor is proposed.
3) Weather data from NOAA for Newark, New Jersey.
4) The pump load is estimated at 100% at X deg. OAT and 50% at X deg. OAT and varies linearly in between.
5) The required VFD motor draw is based on a 2.5 power relationship to load.

Annual Utility Savings	15,364	kWh
Annual Savings	$ 2,259	
Install Variable Speed Drives	$ 22,500	
- HW Pump Cost		
Simple Payback	10	Years

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-3: Install Variable Speed Drives - HW Pump - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
5.0 HP VFD	2	ea	$ 1,485	$ 490		$ 3,267	$ 1,323	$ -	$ 4,590	
5.0 HP Motors	2	ea	$ 525	$ 85		$ 1,155	$ 230	$ -	$ 1,385	
3.0 HP VFD	1	ea	$ 1,000	$ 450		$ 1,100	$ 608	$ -	$ 1,708	
3.0 HP Motors	1	ea	$ 340	$ 90		$ 374	$ 122	$ -	$ 496	
Reprogram DDC system	3	ea	$ 100	$ 350		$ 330	$ 1,418	$ -	$ 1,748	
Electrical - misc.	3	ls	$ 200	$ 150		$ 660	$ 608	$ -	$ 1,268	
2-way or 3-way control valve(s) for system sequence	1	ea	$ 1,000	$ 2,000		$ 1,100	$ 2,700	$ -	$ 3,800	
Pipe pressure sensor/transmitter	1	ea	$ 850	$ 500		$ 935	$ 675	$ -	$ 1,610	
Misc. piping modification	1	ea	$ 200	$ 150		$ 220	$ 203	$ -	$ 423	
						$ -	$ -	$ -	$ -	

$ 17,025	Subtotal
$ 1,703	10% Contingency
$ 3,746	20% Contractor O&P
$ -	0% Engineering
$ 22,500	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

EQUIPMENT	AREA SERVED	COOLING CAPACITY (MBH)
HV-1	Gym	360
	Total Electric DX Cooling:	*360* *MBH*

ECM-4: AHU Equipment Replacment

ECM Description Summary

By replacing older air handling equipment with newer equipment which uses more efficient fan motors and higher SEER/EER DX condensing units, significant electrical energy can be saved. This exsiting unit does not have DX cooling, and is ventilation only; however, cooling is added in the analysis below as a system improvment/moderization, and the fan motors will also be replaced with premium efficiency motors. Control schemes can be incorporated that were not possible with the older equiopment as well. It is recommended these units be replaced by more modern AAON units with supply fan variable speed drives and digital scroll compressors.

ASSUMPTIONS			Comments
Electric Cost	$0.147	/ kWh	
Average run hours per Week	50	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	74	deg F	Setpoint.
Existing equipment motor HP	7.5		Total BTU/hr of DX cooling equipment to be replaced.
Existing motor efficiency	80.0%		Units is 30+ years old; motor efficiency affected by condition and environment over time
Existing Annual Electric Useage	2,333	kWh	

Proposed BTU/Hr rating of replacment DX equipm	360,000	Btu / Hr	Total BTU/hr of DX cooling equipment to be added.
Proposed average EER of replacment DX equipm	14.4		
Proposed equipment motor HP	7.5		Premium efficiency motor with VFD.
Proposed motor efficiency	92.0%		
Proposed Annual Electric Usage	2,332	kWh	

ANNUAL SAVINGS		
Annual Electrical Usage Savings	1	kWh
Annual Cost Savings	$0	
Total Project Cost	$64,500	
Simple Payback	366,797	years

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	3	1	89%	1
92.5	34	10	79%	8
87.5	131	39	68%	27
82.5	500	149	58%	86
77.5	620	185	47%	87
72.5	664	0	0%	0
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	13	0	0%	0
2.5	0	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0

Total	8,738	383	55%	209

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-4: AHU Equipment Replacment - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Existing (1) RTU demolition	1	EA	$ 100	$ 1,500		$ 110	$ 2,025	$ -	$ 2,135	
(1) RTU, 30.0 tons with DX cooling and HW heating	1	EA	$ 30,000	$ 3,500		$ 33,000	$ 4,725	$ -	$ 37,725	
- HW Valve & Piping to RTUs HW coil	1	EA	$ 350	$ 200		$ 385	$ 270	$ -	$ 655	
- Reprogram DDC system for (1) RTU	1	EA	$ 75	$ 300		$ 83	$ 405	$ -	$ 488	
Electrical - misc.	1	LS	$ 1,000	$ 5,000		$ 1,100	$ 6,750	$ -	$ 7,850	
						$ -	$ -	$ -	$ -	

$ 48,853	Subtotal
$ 4,885	10% Contingency
$ 10,748	20% Contractor O&P
$ -	0% Engineering
$ 64,500	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-5: Replace Window A/C units with Energy Star Units

ECM Description Summary
By replacing older DX windo unit air conditioners with newer equipment which have EER ratings, significant electrical energy can be saved. It is recommended these units be replaced by more modern Energy Star rated window units.

ASSUMPTIONS			Comments
Electric Cost	$0.147	/ kWh	
Average run hours per Week	50	Hours	Unit is manually turned on (even if after hours)
Space Balance Point	55	F	
Space Temperature Setpoint	70	deg F	setpoint
Avg. BTU / Hr Rating of existing RTU	12,000	Btu / Hr	(typical size for cooling spaces in this type of building)
Average EER	9.4		

Item	Value	Units	Comments
Total Number of Units	33		
Existing Annual Electric Usage	11,873	kWh	
Proposed EER	11.0		New Energy Star Unit (per Energy webpage)
Proposed Annual Electric Usage	10,146	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Savings	1,727	kWh
Annual Cost Savings	$254	

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	3	1	89%	1
92.5	34	10	79%	8
87.5	131	39	68%	27
82.5	500	149	58%	86
77.5	620	185	47%	87
72.5	664	198	37%	73
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	22	0	0%	0
2.5	13	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	581	49%	282

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-5: Replace Window A/C units with Energy Star Units - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
12,000 MBH Energy Star A/C unit	33	EA	$ 220			$ 7,986	$ -	$ -	$ 7,986	
						$ -	$ -	$ -	$ -	

$ 7,986	Subtotal
$ 559.02	7% tax
$ -	
$ -	
$ 8,500	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

EQUIPMENT	AREA/EQUIPMENT SERVED	COOLING CAPACITY (MBH)
AC-1	Not Working	0
AC-2	Library Room 32	36
AC-3	Not Working	0
AC-4	Room 50	30
	Total Electric DX Cooling:	*66* *MBH*

ECM-6: DX Split Systems Replaced

ECM Description Summary

By replacing older split system DX equipment with higher SEER/EER DX condensing units, significant electrical energy can be saved. Control schemes can be incorporated that were not possible with the older equiopment as well, but the equipment can also operate in same manner as existing (i.e., stand alone, or monitored/sequenced by a BAS). It is recommended these units be replaced by more modern DX split system equipment with high efficiecny fans and compressors.

ASSUMPTIONS			Comments
Electric Cost	$0.147	/ kWh	
Average run hours per Week	50	Hours	
Space Balance Point	55	F	
Space Temperature Setpoint	74	deg F	Setpoint.
BTU/Hr Rating of existing DX equipment	66,000	Btu / Hr	Total BTU/hr of DX cooling equipment to be replaced.
Average EER	7.0		Units average than 11 years old, EERs were 8 when new
Existing Annual Electric Usage	1,971	kWh	

Item	Value	Units	Comments
Proposed EER	14.4		New ductless mini-splits (per manufacturer)
Proposed Annual Electric Usage	958	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Electrical Usage Savings	1,013	kWh
Annual Cost Savings	$149	
Total Project Cost	$37,600	
Simple Payback	253	years

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	3	1	89%	1
92.5	34	10	79%	8
87.5	131	39	68%	27
82.5	500	149	58%	86
77.5	620	185	47%	87
72.5	664	0	0%	0
67.5	854	0	0%	0
62.5	927	0	0%	0
57.5	600	0	0%	0
52.5	610	0	0%	0
47.5	611	0	0%	0
42.5	656	0	0%	0
37.5	1,023	0	0%	0
32.5	734	0	0%	0
27.5	334	0	0%	0
22.5	252	0	0%	0
17.5	125	0	0%	0
12.5	47	0	0%	0
7.5	22	0	0%	0
2.5	13	0	0%	0
-2.5	0	0	0%	0
-7.5	0	0	0%	0
Total	8,760	383	55%	209

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-6: DX Split Systems Replaced - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Existing (4) Acs & CUs demolition	8	EA	$ 100	$ 250		$ 880	$ 2,700	$ -	$ 3,580	
(2) ACs, 3.0 ton air conditioner condensing units	2	EA	$ 2,200	$ 1,200		$ 4,840	$ 3,240	$ -	$ 8,080	
(1) AC, 2.5 ton air conditioner condensing unit	1	EA	$ 2,000	$ 1,000		$ 2,200	$ 1,350	$ -	$ 3,550	
(1) AC, 1.5 ton air conditioner condensing unit	1	EA	$ 1,200	$ 500		$ 1,320	$ 675	$ -	$ 1,995	
- Reprogram DDC system for (4) CUs	8	EA	$ 75	$ 300		$ 660	$ 3,240	$ -	$ 3,900	
Electrical - misc.	1	LS	$ 1,000	$ 5,000		$ 1,100	$ 6,750	$ -	$ 7,850	
						$ -	$ -	$ -	$ -	

$ 28,955	Subtotal
$ 2,896	10% Contingency
$ 5,791	20% Contractor O&P
$ -	0% Engineering
$ 37,600	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

AIR HANDLER	AREA SERVED	FAN MOTOR HP	CFM	OA CFM
HV-1	GYM	7.5	11,500	1,725
		7.5	*HP*	*1,725* *CFM*

ECM-7: HVAC Demand Control Ventilation

ECM Description Summary

It is assumed the original system controls provide the full design ventilation outside air flow. Reducing outside air during occupied time periods will reduce heating and cooling energy used during the occupied period. A limit of 1000 PPM of CO2 is recommended in ASHRAE Standard 62-1982, Ventilation for Acceptable Indoor Air Quality. During unoccupied periods the outside air dampers should be closed.

Electric Cost	$ 0.15	/kWh
Natural Gas Cost	$ 0.11	/therm
Facility Ventilation Heating Load	65,205	BTU/Hour[1,2,3]
Facility Ventilation Cooling Load	18,630	BTU/Hour[1,2,3]
Existing Ventilation Heating Usage	986	therms[5]
Existing Ventilation Cooling Usage	8,253	kWh[5]
Proposed Ventilation Heating Usage	789	therms[6]
Proposed Ventilation Cooling Usage	6,603	kWh[6]
Proposed Ventilation Fan Savings	2,819	kWh[7]
Total heating savings	197	**therms**
Total cooling savings	4,469	**kWh**
Total cost savings	679	
Estimated Total Project Cost	$5,100	[8]
Simple Payback	8	**years**

Assumptions

1	1,725	CFM, OA AHU airflow based exsiting design drawing schedules
2	35	°F, Assumed average heating Δt (mixed air and supply)
3	10	°F, Assumed average cooling Δt (mixed air and supply)
4	5.6	kW of existing supply fan motor calculated based on electrical data from nameplate
5	1,512	AHU run time per heating/cooling seasons [12 hours/day, 21 days/month, 6 months/year]
6	20%	Estimated savings for DCV based on reducing unit run time from 12 hours to 10 hours per day
7	504	Assumed supply fan run time reduction based on 2 hours/day fan is "off" due to DCV
8	$ 5,100	estimated measure cost for installation of sensors and associated controls

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-7: HVAC Demand Control Ventilation - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
CO2 sensor	1	ea	$ 500	$ 150	$ -	$ 550	$ 203	$ -	$ 753	
Replace damper actuators	3	ea	$ 250	$ 50	$ -	$ 825	$ 203	$ -	$ 1,028	
Reprogram DDC system	1	ea	$ 150	$ 350	$ -	$ 165	$ 473	$ -	$ 638	
Miscellaneous electrical/wiring	1	ls	$ 300	$ 750	$ -	$ 330	$ 1,013	$ -	$ 1,343	

$ 3,760	Subtotal
$ 752	10% Contingency
$ 564	20% Contractor O&P
$ -	0% Engineering
$ 5,100	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-8: Re-commission Facility BAS and Integrate Existing HVAC Equipment

ECM Description Summary

The HVAC Building Automation System (BAS) controls consists of an outdated BAS for monitoring and sequencing all HVAC systems and equipment. Due to BAS condition and software, HVAC system sequencing, monitoring, scheduling and monitoring are limited; pneumatic control filed devices, instrument air tubing and compressor are also maintenance intensive. To reduce the energy used by HVAC systems, the BAS system requires replacement by a modern DDC control system with current software and functionality, and complete re-commissioning, Testing and Balancing of all HVAC systems.
This cost analysis provides simple payback time period by reducing HVAC system energy consumption during unoccupied hours.

69,607 Sq Footage

EXISTING CONDITIONS		
Existing Facility Total Electric usage	469,500	kWh
Existing Facility Total Gas usage	23,579	Therms
Existing Facility Cooling Electric usage	122,070	kWh[1]
Existing Facility Heating Natural Gas usage	19334.78	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	12,207	kWh
Proposed Facility Natural Gas Savings	1,933	Therms
SAVINGS		
Retro-Commissioning Electric Savings	12,207	**kWh**
Retro-Commissioning Natural Gas Savings	1,933	**Therms**
Total cost savings	$ 3,728	
Estimated Total Project Cost	$ 34,800	[4]
Simple Payback	9.3	**years**

Assumptions

1	26%	of facility total electricity dedicated to Cooling; Source: E source, data from U.S. Energy Information Administration
2	82%	of facility total natural gas dedicated to Heating; Source: E source, data from U.S. Energy Information Administration
3	10%	Typical Savings associated with Retro-Commissioning of controls based on previous project experience
4		Based on $0.50 / Sq Ft recommissioning cost

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-7: Walk-in Cooler & Freezer Controls

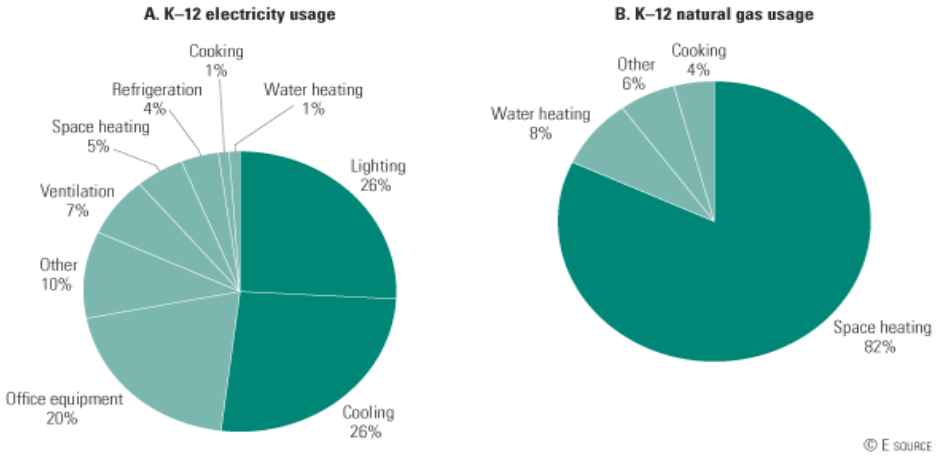
ECM Description Summary

For kitchens that contain walk-in coolers and freezers, CoolTrol is a controller that reduces energy consumption by controlling off of dewpoint temperature. Compressor cycling is reduced and the evaporator fans run 25% to 80% less. Door and frame heaters are also installed and controlled by store dew point temperature; this can reduce run time by up to 95% in coolers and 60% in freezers. The evaporator fan motors are also replaced with hi-efficient fan motors saving 40% to 70% in energy. The proposed system comprises of an anti-sweat door controller, evaporator fan motor replacement and CoolTrol Cooler Control System.

EXISTING CONDITIONS		
Existing Facility Total Electric usage	469,500	kWh
Existing Facility Refridgeration Electric usage	28,170	kWh[1]
Existing Facility Walk-In Electric usage	16,902	kWh[2]
Walk-In Controls System Annual Electric savings	5,071	kWh[3]
SAVINGS		
Walk-In Controls Electric Usage Savings	5,071	**kWh**
Total cost savings	$ 745.38	
Estimated Total Project Cost	$ 15,000	[4]
Simple Payback	20.1	**years**

Assumptions

1 6% of facility total electricity; Source: E source, data from U.S. Energy Information Administration
2 60% of refrigeration attributable to walk-in based on site observations
3 30% Electric load reduction typical for walk-in controllers
4 Based on (2) "Cooltrol" walk-in controls systems



Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-8: Kitchen Hood Control

ECM Description Summary

The Kitchen contains a 10'x4' cooking hood; the exhaust fan is one constant volume 3 HP motor. It is recommended a Me-Link kitchen hood controller be installed to reduce run time of the exhaust fan. A variable speed drive with a high efficiency motor will need to be installed on the exhaust fan.
Upon activation, the hood lights turn on and the fans reach a preset minimum speed of between 10% and 50%. When cooking appliances turn on, the fan speed increases based on exhaust air temperature. During actual cooking, the speed increases to 100% until smoke and heat are removed. The controller will also send a signal to the kitchen makeup air units to turn on/off the supply fan motor, or to modulate the speed on the supply fan drive based on exhaust air quantity. Variable speed drives with high efficiency motors will need to be installed on the exhaust fan and makeup air units supply fans motors.
Reducing exhaust and make-up fan speed reduces energy consumption. The system and equipment can also act as an economizer when indoor and outdoor conditions are right for free cooling. Finally, the controls reduce hood noise in the kitchen by up to 90% when the fans slow down.

Motor Operating Savings

Hours of Operation (per day)	6		A
Days/Year	190		B
Weeks/Year	38		C
Motor HP	3		D
Equivalent KW	1.87	KW	E
Cost of Electricity	$0.15	KWh	F
Total Time/Year	1140	hrs/year	G
Total KWH/YR	2126	KWh	H

% Rated RPM I	% Run Time J	Time K J * G	Output L I * E ^ 2.5	KWH/YR M L *K
100%	9%	103	1.865	191
90%	11%	125	1.433	180
80%	14%	160	1.068	170
70%	35%	399	0.765	305
60%	18%	205	0.520	107
50%	13%	148	0.330	49
40%	0%	0	0.189	0
30%	0%	0	0.092	0
20%	0%	0	0.033	0
10%	0%	0	0.006	0
				1,002 N

Total Savings .= H - N 1,124 KWh

Conditioned Make Up Air: Heating

Previous Net Exhaust Volume	3,000	CFM	
New Net Exhaust Volume	2,157	CFM	Note 1
Previous net heat load	98,820	BTU/hr	
new net heat load	71,052	BTU/hr	
Design Indoor Conditions	68	F	
Average Outdoor Air Temp (during Heating)	37.5	F	
Heating Hours	4,589	hrs/yr	
Total kWh Savings *(no natural gas in building)*	3,614	kWh	

% Rated RPM I	% Run Time J	H * J
100%	9%	9.00%
90%	11%	9.90%
80%	14%	11.20%
70%	35%	24.50%
60%	18%	10.80%
50%	13%	6.50%
40%	0%	0.00%
30%	0%	0.00%
20%	0%	0.00%
10%	0%	0.00%
Avg RPM		71.90%

Cost of Energy = $0.15 / kWh

Reduced Electricity Savings =	**1,124**	**kWh**
Reduced Fuel Savings =	**3,614**	**therms**
Reduced Financial Savings =	**$696**	

Annual Electric Utility Savings	1,124	kWh
Annual Electric Heating Savings	3,614	kWh (no natural gas)
Annual Savings	$ 696	
Add Variable Speed Kitchen Hood	$ 34,600	
Simple Payback	50	Years

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-8: Kitchen Hood Control - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Me-Link Kitchen Hood Control System	1	ea	$ 15,000	$ 2,000		$ 16,500	$ 2,700	$ -	$ 19,200	
3.0 HP VFDs (1-exhaust fan)	1	ea	$ 1,335	$ 490		$ 1,469	$ 662	$ -	$ 2,130	
3.0 HP Motors	1	ea	$ 465	$ 85		$ 512	$ 115	$ -	$ 626	
Reprogram DDC system	1	ea	$ 100	$ 1,200		$ 110	$ 1,620	$ -	$ 1,730	
Electrical - misc.	1	ls	$ 200	$ 500		$ 220	$ 675	$ -	$ 895	
Remote bulb thermostat	2	ea	$ 500	$ 200		$ 1,100	$ 540	$ -	$ 1,640	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 26,221	Subtotal
$ 2,622	10% Contingency
$ 5,769	20% Contractor O&P
$ -	0% Engineering
$ 34,600	**Total**

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-11: Replace Electric Kitchen Equipment with Natural Gas Equipment

ECM Description Summary

A commercial cafeteria kitchen typically contains large equipment such as a double stack oven, a full size range with oven, a food warmer(s), table top kettle cooker(s), etc. This equipment consumes large ammounts of energy, and wiith the cost of electricity versus natural gas, it is worthwhile to consider replacing electric equipment with nagtural gas equipment. The assumption of this calculation is that the operating hours and electrical power consumption of the existing electrical equipment are replaced with newer, more efficient equipment using natural gas. The savings are compared to the cost of new gas kitchen equipment; the connection cost (if any) to the natural gas utility and piping in the building is not included.

Existing Fuel Electric
Proposed Fuel Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.15	/ kWh	
Proposed Fuel Cost	$ 1.00	/ Therm	
Kitchen Equipment			
- Commercial Double Stack Oven	42.0	kW	Based on equipment nameplat data
- Commercial Tabletop Kettle	13.1	kW	Based on equipment nameplat data
- Commercial Tabletop Steamer	15.0	kW	Based on equipment nameplat data
- Total Equipmetn kW	70.1	**kW**	
Kitchen Annual Operating Hours	1,140	hours	6 hours per day x 5 days per week x 38 weeks per year
Baseline Equipment Efficiency	100%		
Baseline Annual Electric Use	79,914	**kWh**	
Baseline Annual Electric Cost	$ 11,747		
Proposed Equipment Efficiency	80%		Approxmiation
Proposed Fuel Use	2,727	**Therms**	Baseline Electric Use x 3,412 BTU/kWh / 100,000 BTU/Therm
Proposed Fuel Cost	$ 2,727		
Annual Savings	$ 9,021		
Natural Gas Equipment Project Cost	$ 38,900		
Simple Payback	4.3	Years	

*Note to engineer: Link savings back to summary sheet in appropriate column.

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

ECM-12: Replace Electric Kitchen Equipment with Natural Gas Equipment - Cost

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Remove Existing Elec. Kitchen Equipment	1	LS	$ 100	$ 2,000		$ 110	$ 2,700	$ -	$ 2,810	
- Commercial Double Stack Oven	1	EA	$ 6,700	$ 100		$ 7,370	$ 135	$ -	$ 7,505	
- Commercial Tabletop Kettle	1	EA	$ 3,400	$ 250		$ 3,740	$ 338	$ -	$ 4,078	
- Commercial Tabletop Steamer	1	EA	$ 4,200	$ 250		$ 4,620	$ 338	$ -	$ 4,958	
Miscellaneous Electrical	1	LS	$ 250	$ 500		$ 275	$ 675	$ -	$ 950	
Miscellaneous Natural Gas Piping	1	LS	$ 1,000	$ 1,000		$ 1,100	$ 1,350	$ -	$ 2,450	
Kitchen Hood Fire Suppression System	1	LS	$ 5,500	$ 500		$ 6,050	$ 675	$ -	$ 6,725	
						$ -	$ -	$ -	$ -	

$ 29,475	Subtotal
$ 2,947.50	10% Contingency
$ 6,484.50	20% Contractor O&P
$ -	0% Engineering
$ 38,900	**Total**

Existing Facilities Program Lighting Form:

Performance Based

Applicant Name: Upper Township School District - NJBPU

Facility Name: Upper Township Elementary School

Date: 5/1/2012

INSTRUCTIONS

Use one line for each fixture type in a room or area.

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
1	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 28		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Wall Switch	0.20	2,000	2,000	396
2	50 Old Tuckahoe Road, Marmora, NJ 08230	1	COMPUTER ROOM 27		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Wall Switch	0.20	2,000	2,000	396
3	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 26		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Wall Switch	0.20	2,000	2,000	396
4	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 25		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Wall Switch	0.20	2,000	2,000	396
5	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM		24	MV400/1	455	10.92	Wall Switch	24	Custom Fixture 4	200	4.80	Wall Switch	6.12	2,480	2,480	15,178
6	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
7	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS		4	FU2LL	60	0.24	Wall Switch	4	FU2ILL-R	52	0.21	Wall Switch	0.03	2,000	2,000	64
8	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42SSILL	48	0.24	Wall Switch	0.06	2,480	2,480	149
9	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		8	CFT28/1	33	0.26	Wall Switch	8	CFT28/1	33	0.26	Wall Switch	0.00	2,480	2,480	0
10	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
11	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.00	2,480	2,480	0
12	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.00	2,480	2,480	0
13	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Wall Switch	0.02	2,000	2,000	32
14	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42SSILL	48	0.24	Wall Switch	0.06	2,480	2,480	149
15	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		6	CFT28/1	33	0.20	Wall Switch	6	CFT28/1	33	0.20	Wall Switch	0.00	2,480	2,480	0
16	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
17	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.00	2,480	2,480	0
18	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.00	2,480	2,480	0
19	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
20	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
21	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY GYM)		4	FU2LL	60	0.24	Wall Switch	4	FU2ILL-R	52	0.21	Wall Switch	0.03	2,000	2,000	64
22	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
23	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY GYM)		5	FU2LL	60	0.30	Wall Switch	5	FU2ILL-R	52	0.26	Wall Switch	0.04	2,000	2,000	80
24	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CONFERENCE ROOM		4	F44LL	118	0.47	Wall Switch	4	F44SSILL	96	0.38	Wall Switch	0.09	2,000	2,000	176
25	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
26	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Wall Switch	0.02	2,000	2,000	32
27	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY		37	F44LL	118	4.37	Wall Switch	37	F44SSILL	96	3.55	Wall Switch	0.81	2,000	2,000	1,628
28	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY SERVER ROOM		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
29	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 31)		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
30	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 31		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
31	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 30		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
32	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM		1	F42LL	60	0.06	Wall Switch	1	F42SSILL	48	0.05	Wall Switch	0.01	2,480	2,480	30
33	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 29		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
34	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		6	F44LL	118	0.71	Wall Switch	6	F44SSILL	96	0.58	Wall Switch	0.13	2,000	2,000	264
35	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
36	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 GIRLS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
37	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 BOYS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
38	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
39	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 23		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Wall Switch	0.26	2,000	2,000	528
40	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 24		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Wall Switch	0.26	2,000	2,000	528
41	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 4)		1	F42LL	60	0.06	Wall Switch	1	F42SSILL	48	0.05	Wall Switch	0.01	2,480	2,480	30
42	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 4)		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Wall Switch	0.02	2,000	2,000	44
43	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
44	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MUSIC ROOM 4		18	FU2LL	60	1.08	Wall Switch	18	FU2ILL-R	52	0.94	Wall Switch	0.14	2,000	2,000	288
45	50 Old Tuckahoe Road, Marmora, NJ 08230	1	RESTROOM (BY 39)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
46	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 39		6	FU2LL	60	0.36	Wall Switch	6	FU2ILL-R	52	0.31	Wall Switch	0.05	2,000	2,000	96
47	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3		15	FU2LL	60	0.90	Wall Switch	15	FU2ILL-R	52	0.78	Wall Switch	0.12	2,000	2,000	240
48	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
49	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
50	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 2		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
51	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 1		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
52	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE		5	F44LL	118	0.59	Wall Switch	5	F44SSILL	96	0.48	Wall Switch	0.11	2,000	2,000	220
53	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Wall Switch	0.02	2,000	2,000	44
54	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
55	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM TOILET		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Wall Switch	0.02	2,000	2,000	44
56	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Wall Switch	0.07	2,000	2,000	132
57	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Wall Switch	0.20	2,000	2,000	396
58	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Wall Switch	0.05	2,000	2,000	108
59	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE CLOSET		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Wall Switch	0.02	2,000	2,000	44
60	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Wall Switch	0.05	2,000	2,000	108
61	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY OFFICE)		3	FU2LL	60	0.18	Wall Switch	3	FU2ILL-R	52	0.16	Wall Switch	0.02	2,000	2,000	48
62	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN		10	FU2LL	60	0.60	Wall Switch	10	FU2ILL-R	52	0.52	Wall Switch	0.08	2,000	2,000	160
63	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN DRY STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
64	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN WALK-INS AREA		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
65	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/ALL PURPOSE ROOM		16	F44LL	118	1.89	Wall Switch	16	F44SSILL	96	1.54	Wall Switch	0.35	2,000	2,000	704
66	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/APR STAGE		14	I60/1	60	0.84	Wall Switch	14	CFT28/1	33	0.46	Wall Switch	0.38	2,000	2,000	756
67	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA STORAGE/ENTRANCE		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Wall Switch	0.05	2,000	2,000	108

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
68	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET (BY BOLER RM)		1	FU2LL	60	0.06	Breaker	1	FU2ILL-R	52	0.05	Breaker	0.01	2,000	2,000	16
69	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOLER ROOM CORRIDOR		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
70	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOILER ROOM		6	FU2LL	60	0.36	Wall Switch	6	FU2ILL-R	52	0.31	Wall Switch	0.05	2,000	2,000	96
71	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BREAK ROOM (BY BOILER RM)		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Wall Switch	0.02	2,000	2,000	44
72	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 4)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
73	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 5		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
74	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 7		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
75	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 6		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
76	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
77	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
78	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
79	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
80	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CLOSET (BY 8)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
81	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 8		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
82	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 9		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
83	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 10		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
84	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 11		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
85	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 12		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
86	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 13		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
87	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM		5	F44LL	118	0.59	Wall Switch	5	F44SSILL	96	0.48	Wall Switch	0.11	2,000	2,000	220
88	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM STORAGE (W/ TANK)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
89	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 14		14	FU2LL	60	0.84	Wall Switch	14	FU2ILL-R	52	0.73	Wall Switch	0.11	2,000	2,000	224
90	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 15		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
91	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 16		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Wall Switch	0.13	2,000	2,000	256
92	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
93	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
94	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46		3	FU2LL	60	0.18	Wall Switch	3	FU2ILL-R	52	0.16	Wall Switch	0.02	2,000	2,000	48
95	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 TOILET		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Wall Switch	0.00	2,000	2,000	0
96	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 SHOWER		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Wall Switch	0.00	2,000	2,000	0
97	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Wall Switch	0.04	2,000	2,000	88
98	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
99	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 17		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Wall Switch	0.31	2,000	2,000	616
100	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 18		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Wall Switch	0.31	2,000	2,000	616
101	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 19		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Wall Switch	0.31	2,000	2,000	616
102	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 20		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Wall Switch	0.31	2,000	2,000	616
103	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21		13	F44LL	118	1.53	Wall Switch	13	F44SSILL	96	1.25	Wall Switch	0.29	2,000	2,000	572
104	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21 KILN		7	FU2LL	60	0.42	Wall Switch	7	FU2ILL-R	52	0.36	Wall Switch	0.06	2,000	2,000	112
105	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 22		25	FU2LL	60	1.50	Wall Switch	25	FU2ILL-R	52	1.30	Wall Switch	0.20	2,000	2,000	400
106	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR A		16	CFT40/1	46	0.74	Wall Switch	16	CFT40/1	46	0.74	Wall Switch	0.00	2,000	2,000	0
107	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR B		21	F42LL	60	1.26	Wall Switch	21	F42SSILL	48	1.01	Wall Switch	0.25	2,000	2,000	504
108	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR C&D		4	F42LL	60	0.24	Wall Switch	4	F42SSILL	48	0.19	Wall Switch	0.05	2,000	2,000	96
109	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR E,F&G		12	F42LL	60	0.72	Wall Switch	12	F42SSILL	48	0.58	Wall Switch	0.14	2,000	2,000	288
110	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM (BY FACULTY)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
111	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Wall Switch	0.02	2,000	2,000	32
112	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Wall Switch	0.01	2,000	2,000	16
113	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR H		19	F44LL	118	2.24	Wall Switch	19	F44SSILL	96	1.82	Wall Switch	0.42	2,000	2,000	836
114	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR I		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Wall Switch	0.26	2,000	2,000	528
115	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR J		6	F44LL	118	0.71	Wall Switch	6	F44SSILL	96	0.58	Wall Switch	0.13	2,000	2,000	264
116	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR K		4	F44LL	118	0.47	Wall Switch	4	F44SSILL	96	0.38	Wall Switch	0.09	2,000	2,000	176
117	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Wall Switch	1.44	2,000	2,000	2,880
118	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
119	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
120	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Wall Switch	1.44	2,000	2,000	2,880
121	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
122	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
123	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Wall Switch	1.44	2,000	2,000	2,880
124	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
125	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
126	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Wall Switch	1.44	2,000	2,000	2,880
127	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
128	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Wall Switch	0.03	2,000	2,000	54
129	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 1		7	MV175/1	205	1.44	Light Sensor & Timer	7	MV175/1	205	1.44	Light Sensor & Timer	0.00	4,368	4,368	0
130	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL FIXTURE		11	I60/1	60	0.66	Light Sensor & Timer	11	CFT28/1	33	0.36	Light Sensor & Timer	0.30	2,000	2,000	594
131	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 2		2	HPS150/1	188	0.38	Light Sensor & Timer	2	HPS150/1	188	0.38	Light Sensor & Timer	0.00	2,000	2,000	0
132	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 3		12	MH250/1	295	3.54	Light Sensor & Timer	12	MH250/1	295	3.54	Light Sensor & Timer	0.00	4,368	4,368	0
133	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 4		2	HPS250/1	295	0.59	Light Sensor & Timer	2	HPS250/1	295	0.59	Light Sensor & Timer	0.00	2,000	2,000	0
					873		**Total Pre kW**	**90.51**	**Total Post Fixt.**	**921**		**Total Pre kW**	**67.44**	**Total kW Saved**	**23.07**	**Total Annual kWh Saved**		**49,150.72**

Existing Facilities Program Lighting Form:

Performance Based

Applicant Name: Upper Township School District - NJBPU

Facility Name: Upper Township Elementary School

Date: 5/1/2012

INSTRUCTIONS

Use one line for each fixture type in a room or area.

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
1	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 28		9	F44LL	118	1.06	Wall Switch	9	F44LL	118	1.06	Occ Sensor	0.00	2,000	1,400	637
2	50 Old Tuckahoe Road, Marmora, NJ 08230	1	COMPUTER ROOM 27		9	F44LL	118	1.06	Wall Switch	9	F44LL	118	1.06	Occ Sensor	0.00	2,000	1,400	637
3	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 26		9	F44LL	118	1.06	Wall Switch	9	F44LL	118	1.06	Occ Sensor	0.00	2,000	1,400	637
4	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 25		9	F44LL	118	1.06	Wall Switch	9	F44LL	118	1.06	Occ Sensor	0.00	2,000	1,400	637
5	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM		24	MV400/1	455	10.92	Wall Switch	24	MV400/1	455	10.92	Occ Sensor	0.00	2,480	2,080	4,368
6	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
7	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS		4	FU2LL	60	0.24	Wall Switch	4	FU2LL	60	0.24	Occ Sensor	0.00	2,000	1,400	144
8	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42LL	60	0.30	Occ Sensor	0.00	2,480	2,080	120
9	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		8	CFT28/1	33	0.26	Wall Switch	8	CFT28/1	33	0.26	Occ Sensor	0.00	2,480	2,080	106
10	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
11	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
12	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
13	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS		2	FU2LL	60	0.12	Wall Switch	2	FU2LL	60	0.12	Occ Sensor	0.00	2,000	1,400	72
14	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42LL	60	0.30	Occ Sensor	0.00	2,480	2,080	120
15	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		6	CFT28/1	33	0.20	Wall Switch	6	CFT28/1	33	0.20	Occ Sensor	0.00	2,480	2,080	79
16	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
17	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
18	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
19	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
20	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
21	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY GYM)		4	FU2LL	60	0.24	Wall Switch	4	FU2LL	60	0.24	Occ Sensor	0.00	2,000	1,400	144
22	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
23	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY GYM)		5	FU2LL	60	0.30	Wall Switch	5	FU2LL	60	0.30	Occ Sensor	0.00	2,000	1,400	180
24	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CONFERENCE ROOM		4	F44LL	118	0.47	Wall Switch	4	F44LL	118	0.47	Occ Sensor	0.00	2,000	1,400	283
25	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
26	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	FU2LL	60	0.12	Wall Switch	2	FU2LL	60	0.12	Occ Sensor	0.00	2,000	1,400	72
27	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY		37	F44LL	118	4.37	Wall Switch	37	F44LL	118	4.37	Occ Sensor	0.00	2,000	1,400	2,620
28	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY SERVER ROOM		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
29	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 31)		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
30	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 31		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
31	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 30		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
32	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM		1	F42LL	60	0.06	Wall Switch	1	F42LL	60	0.06	Occ Sensor	0.00	2,480	2,080	24
33	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 29		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
34	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		6	F44LL	118	0.71	Wall Switch	6	F44LL	118	0.71	Occ Sensor	0.00	2,000	1,400	425
35	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
36	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 GIRLS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
37	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 BOYS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
38	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
39	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 23		12	F44LL	118	1.42	Wall Switch	12	F44LL	118	1.42	Occ Sensor	0.00	2,000	1,400	850
40	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 24		12	F44LL	118	1.42	Wall Switch	12	F44LL	118	1.42	Occ Sensor	0.00	2,000	1,400	850
41	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 4)		1	F42LL	60	0.06	Wall Switch	1	F42LL	60	0.06	Occ Sensor	0.00	2,480	2,080	24
42	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 4)		1	F44LL	118	0.12	Wall Switch	1	F44LL	118	0.12	Occ Sensor	0.00	2,000	1,400	71
43	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
44	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MUSIC ROOM 4		18	FU2LL	60	1.08	Wall Switch	18	FU2LL	60	1.08	Occ Sensor	0.00	2,000	1,400	648
45	50 Old Tuckahoe Road, Marmora, NJ 08230	1	RESTROOM (BY 39)		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
46	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 39		6	FU2LL	60	0.36	Wall Switch	6	FU2LL	60	0.36	Occ Sensor	0.00	2,000	1,400	216
47	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3		15	FU2LL	60	0.90	Wall Switch	15	FU2LL	60	0.90	Occ Sensor	0.00	2,000	1,400	540
48	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
49	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
50	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 2		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
51	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 1		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
52	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE		5	F44LL	118	0.59	Wall Switch	5	F44LL	118	0.59	Occ Sensor	0.00	2,000	1,400	354
53	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		1	F44LL	118	0.12	Wall Switch	1	F44LL	118	0.12	Occ Sensor	0.00	2,000	1,400	71
54	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
55	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM TOILET		1	F44LL	118	0.12	Wall Switch	1	F44LL	118	0.12	Occ Sensor	0.00	2,000	1,400	71
56	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		3	F44LL	118	0.35	Wall Switch	3	F44LL	118	0.35	Occ Sensor	0.00	2,000	1,400	212
57	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		9	F44LL	118	1.06	Wall Switch	9	F44LL	118	1.06	Occ Sensor	0.00	2,000	1,400	637
58	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	I60/1	60	0.12	Occ Sensor	0.00	2,000	1,400	72
59	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE CLOSET		1	F44LL	118	0.12	Wall Switch	1	F44LL	118	0.12	Occ Sensor	0.00	2,000	1,400	71
60	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	I60/1	60	0.12	Occ Sensor	0.00	2,000	1,400	72
61	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY OFFICE)		3	FU2LL	60	0.18	Wall Switch	3	FU2LL	60	0.18	Occ Sensor	0.00	2,000	1,400	108
62	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN		10	FU2LL	60	0.60	Wall Switch	10	FU2LL	60	0.60	Occ Sensor	0.00	2,000	1,400	360
63	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN DRY STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
64	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN WALK-INS AREA		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
65	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/ALL PURPOSE ROOM		16	F44LL	118	1.89	Wall Switch	16	F44LL	118	1.89	Occ Sensor	0.00	2,000	1,400	1,133
66	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/APR STAGE		14	I60/1	60	0.84	Wall Switch	14	I60/1	60	0.84	Occ Sensor	0.00	2,000	1,400	504
67	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA STORAGE/ENTRANCE		2	I60/1	60	0.12	Wall Switch	2	I60/1	60	0.12	Occ Sensor	0.00	2,000	1,400	72

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
68	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET (BY BOLER RM)		1	FU2LL	60	0.06	Breaker	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
69	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOLER ROOM CORRIDOR		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
70	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOILER ROOM		6	FU2LL	60	0.36	Wall Switch	6	FU2LL	60	0.36	Occ Sensor	0.00	2,000	1,400	216
71	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BREAK ROOM (BY BOILER RM)		1	F44LL	118	0.12	Wall Switch	1	F44LL	118	0.12	Occ Sensor	0.00	2,000	1,400	71
72	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 4)		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
73	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 5		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
74	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 7		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
75	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 6		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
76	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
77	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
78	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
79	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
80	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CLOSET (BY 8)		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
81	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 8		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
82	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 9		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
83	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 10		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
84	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 11		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
85	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 12		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
86	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 13		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
87	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM		5	F44LL	118	0.59	Wall Switch	5	F44LL	118	0.59	Occ Sensor	0.00	2,000	1,400	354
88	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM STORAGE (W/ TANK)		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
89	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 14		14	FU2LL	60	0.84	Wall Switch	14	FU2LL	60	0.84	Occ Sensor	0.00	2,000	1,400	504
90	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 15		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
91	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 16		16	FU2LL	60	0.96	Wall Switch	16	FU2LL	60	0.96	Occ Sensor	0.00	2,000	1,400	576
92	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
93	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
94	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46		3	FU2LL	60	0.18	Wall Switch	3	FU2LL	60	0.18	Occ Sensor	0.00	2,000	1,400	108
95	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 TOILET		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Occ Sensor	0.00	2,000	1,400	28
96	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 SHOWER		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Occ Sensor	0.00	2,000	1,400	28
97	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		2	F44LL	118	0.24	Wall Switch	2	F44LL	118	0.24	Occ Sensor	0.00	2,000	1,400	142
98	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
99	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 17		14	F44LL	118	1.65	Wall Switch	14	F44LL	118	1.65	Occ Sensor	0.00	2,000	1,400	991
100	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 18		14	F44LL	118	1.65	Wall Switch	14	F44LL	118	1.65	Occ Sensor	0.00	2,000	1,400	991
101	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 19		14	F44LL	118	1.65	Wall Switch	14	F44LL	118	1.65	Occ Sensor	0.00	2,000	1,400	991
102	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 20		14	F44LL	118	1.65	Wall Switch	14	F44LL	118	1.65	Occ Sensor	0.00	2,000	1,400	991
103	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21		13	F44LL	118	1.53	Wall Switch	13	F44LL	118	1.53	Occ Sensor	0.00	2,000	1,400	920
104	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21 KILN		7	FU2LL	60	0.42	Wall Switch	7	FU2LL	60	0.42	Occ Sensor	0.00	2,000	1,400	252
105	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 22		25	FU2LL	60	1.50	Wall Switch	25	FU2LL	60	1.50	Occ Sensor	0.00	2,000	1,400	900
106	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR A		16	CFT40/1	46	0.74	Wall Switch	16	CFT40/1	46	0.74	Occ Sensor	0.00	2,000	1,400	442
107	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR B		21	F42LL	60	1.26	Wall Switch	21	F42LL	60	1.26	Occ Sensor	0.00	2,000	1,400	756
108	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR C&D		4	F42LL	60	0.24	Wall Switch	4	F42LL	60	0.24	Occ Sensor	0.00	2,000	1,400	144
109	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR E,F&G		12	F42LL	60	0.72	Wall Switch	12	F42LL	60	0.72	Occ Sensor	0.00	2,000	1,400	432
110	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM (BY FACULTY)		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
111	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		2	FU2LL	60	0.12	Wall Switch	2	FU2LL	60	0.12	Occ Sensor	0.00	2,000	1,400	72
112	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2LL	60	0.06	Occ Sensor	0.00	2,000	1,400	36
113	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR H		19	F44LL	118	2.24	Wall Switch	19	F44LL	118	2.24	Occ Sensor	0.00	2,000	1,400	1,345
114	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR I		12	F44LL	118	1.42	Wall Switch	12	F44LL	118	1.42	Occ Sensor	0.00	2,000	1,400	850
115	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR J		6	F44LL	118	0.71	Wall Switch	6	F44LL	118	0.71	Occ Sensor	0.00	2,000	1,400	425
116	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR K		4	F44LL	118	0.47	Wall Switch	4	F44LL	118	0.47	Occ Sensor	0.00	2,000	1,400	283
117	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1		12	Custom Fixture 11	216	2.59	Wall Switch	12	Custom Fixture 11	216	2.59	Occ Sensor	0.00	2,000	1,400	1,555
118	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 STORAGE		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
119	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
120	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2		12	Custom Fixture 11	216	2.59	Wall Switch	12	Custom Fixture 11	216	2.59	Occ Sensor	0.00	2,000	1,400	1,555
121	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 STORAGE		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
122	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
123	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3		12	Custom Fixture 11	216	2.59	Wall Switch	12	Custom Fixture 11	216	2.59	Occ Sensor	0.00	2,000	1,400	1,555
124	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 STORAGE		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
125	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
126	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4		12	Custom Fixture 11	216	2.59	Wall Switch	12	Custom Fixture 11	216	2.59	Occ Sensor	0.00	2,000	1,400	1,555
127	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 STORAGE		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
128	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 TOILET		1	I60/1	60	0.06	Wall Switch	1	I60/1	60	0.06	Occ Sensor	0.00	2,000	1,400	36
129	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 1		7	MV175/1	205	1.44	Light Sensor & Timer	7	MV175/1	205	1.44	Light Sensor & Timer	0.00	4,368	2,184	3,134
130	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL FIXTURE		11	I60/1	60	0.66	Light Sensor & Timer	11	I60/1	60	0.66	Light Sensor & Timer	0.00	2,000	1,400	396
131	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 2		2	HPS150/1	188	0.38	Light Sensor & Timer	2	HPS150/1	188	0.38	Light Sensor & Timer	0.00	2,000	1,400	226
132	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 3		12	MH250/1	295	3.54	Light Sensor & Timer	12	MH250/1	295	3.54	Light Sensor & Timer	0.00	4,368	2,184	7,731
133	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 4		2	HPS250/1	295	0.59	Light Sensor & Timer	2	HPS250/1	295	0.59	Light Sensor & Timer	0.00	2,000	1,400	354
					873		**Total Pre kW**	**90.51**	**Total Post Fixt.**	**873**		**Total Pre kW**	**90.51**	**Total kW Saved**		**Total Annual kWh Saved**		**59,741.40**

Existing Facilities Program Lighting Form:

Performance Based

Applicant Name: Upper Township School District - NJBPU

Facility Name: Upper Township Elementary School

Date: 5/1/2012

INSTRUCTIONS

Use one line for each fixture type in a room or area.

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
1	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 28		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Occ Sensor	0.20	2,000	1,400	914
2	50 Old Tuckahoe Road, Marmora, NJ 08230	1	COMPUTER ROOM 27		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Occ Sensor	0.20	2,000	1,400	914
3	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 26		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Occ Sensor	0.20	2,000	1,400	914
4	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 25		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Occ Sensor	0.20	2,000	1,400	914
5	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM		24	MV400/1	455	10.92	Wall Switch	24	Custom Fixture 4	200	4.80	Occ Sensor	6.12	2,480	2,080	17,098
6	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
7	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS		4	FU2LL	60	0.24	Wall Switch	4	FU2ILL-R	52	0.21	Occ Sensor	0.03	2,000	1,400	189
8	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42SSILL	48	0.24	Occ Sensor	0.06	2,480	2,080	245
9	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		8	CFT28/1	33	0.26	Wall Switch	8	CFT28/1	33	0.26	Occ Sensor	0.00	2,480	2,080	106
10	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
11	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
12	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM GIRLS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
13	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Occ Sensor	0.02	2,000	1,400	94
14	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		5	F42LL	60	0.30	Wall Switch	5	F42SSILL	48	0.24	Occ Sensor	0.06	2,480	2,080	245
15	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		6	CFT28/1	33	0.20	Wall Switch	6	CFT28/1	33	0.20	Occ Sensor	0.00	2,480	2,080	79
16	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
17	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS RESTROOM		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
18	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS SHOWERS		1	CFT28/1	33	0.03	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.00	2,480	2,080	13
19	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS CORRIDOR		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
20	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GYM BOYS LOCKERS STORAGE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
21	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY GYM)		4	FU2LL	60	0.24	Wall Switch	4	FU2ILL-R	52	0.21	Occ Sensor	0.03	2,000	1,400	189
22	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
23	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY GYM)		5	FU2LL	60	0.30	Wall Switch	5	FU2ILL-R	52	0.26	Occ Sensor	0.04	2,000	1,400	236
24	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CONFERENCE ROOM		4	F44LL	118	0.47	Wall Switch	4	F44SSILL	96	0.38	Occ Sensor	0.09	2,000	1,400	406
25	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
26	50 Old Tuckahoe Road, Marmora, NJ 08230	1	OFFICE		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Occ Sensor	0.02	2,000	1,400	94
27	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY		37	F44LL	118	4.37	Wall Switch	37	F44SSILL	96	3.55	Occ Sensor	0.81	2,000	1,400	3,759
28	50 Old Tuckahoe Road, Marmora, NJ 08230	1	LIBRARY SERVER ROOM		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
29	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 31)		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
30	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 31		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
31	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 30		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
32	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM		1	F42LL	60	0.06	Wall Switch	1	F42SSILL	48	0.05	Occ Sensor	0.01	2,480	2,080	49
33	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 29		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
34	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		6	F44LL	118	0.71	Wall Switch	6	F44SSILL	96	0.58	Occ Sensor	0.13	2,000	1,400	610
35	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
36	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 GIRLS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
37	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 50 BOYS TOILET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
38	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
39	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 23		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Occ Sensor	0.26	2,000	1,400	1,219
40	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 24		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Occ Sensor	0.26	2,000	1,400	1,219
41	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 4)		1	F42LL	60	0.06	Wall Switch	1	F42SSILL	48	0.05	Occ Sensor	0.01	2,480	2,080	49
42	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 4)		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Occ Sensor	0.02	2,000	1,400	102
43	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
44	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MUSIC ROOM 4		18	FU2LL	60	1.08	Wall Switch	18	FU2ILL-R	52	0.94	Occ Sensor	0.14	2,000	1,400	850
45	50 Old Tuckahoe Road, Marmora, NJ 08230	1	RESTROOM (BY 39)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
46	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 39		6	FU2LL	60	0.36	Wall Switch	6	FU2ILL-R	52	0.31	Occ Sensor	0.05	2,000	1,400	283
47	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3		15	FU2LL	60	0.90	Wall Switch	15	FU2ILL-R	52	0.78	Occ Sensor	0.12	2,000	1,400	708
48	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
49	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
50	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 2		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
51	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 1		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
52	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE		5	F44LL	118	0.59	Wall Switch	5	F44SSILL	96	0.48	Occ Sensor	0.11	2,000	1,400	508
53	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Occ Sensor	0.02	2,000	1,400	102
54	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM ROOM		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
55	50 Old Tuckahoe Road, Marmora, NJ 08230	1	NURSES OFFICE EXAM TOILET		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Occ Sensor	0.02	2,000	1,400	102
56	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		3	F44LL	118	0.35	Wall Switch	3	F44SSILL	96	0.29	Occ Sensor	0.07	2,000	1,400	305
57	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE		9	F44LL	118	1.06	Wall Switch	9	F44SSILL	96	0.86	Occ Sensor	0.20	2,000	1,400	914
58	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Occ Sensor	0.05	2,000	1,400	148
59	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE CLOSET		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Occ Sensor	0.02	2,000	1,400	102
60	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MAIN OFFICE TOILET		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Occ Sensor	0.05	2,000	1,400	148
61	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY OFFICE)		3	FU2LL	60	0.18	Wall Switch	3	FU2ILL-R	52	0.16	Occ Sensor	0.02	2,000	1,400	142
62	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN		10	FU2LL	60	0.60	Wall Switch	10	FU2ILL-R	52	0.52	Occ Sensor	0.08	2,000	1,400	472
63	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN DRY STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
64	50 Old Tuckahoe Road, Marmora, NJ 08230	1	KITCHEN WALK-INS AREA		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
65	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/ALL PURPOSE ROOM		16	F44LL	118	1.89	Wall Switch	16	F44SSILL	96	1.54	Occ Sensor	0.35	2,000	1,400	1,626
66	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA/APR STAGE		14	I60/1	60	0.84	Wall Switch	14	CFT28/1	33	0.46	Occ Sensor	0.38	2,000	1,400	1,033
67	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CAFETERIA STORAGE/ENTRANCE		2	I60/1	60	0.12	Wall Switch	2	CFT28/1	33	0.07	Occ Sensor	0.05	2,000	1,400	148

					PRE-INSTALLATION					POST-INSTALLATION								
Line Item	**Building**	**Floor**	**Area Description**	**Usage Group ID**	**Pre Fixt. No.**	**Pre Fixt Code**	**Pre Watts / Fixt**	**Pre kW / Space**	**Existing Control**	**Post Fixt No.**	**Post Fixt Code**	**Post Watts/ Fixt**	**Post kW / Space**	**Proposed Control**	**kW Saved**	**Baseline Annual Hours**	**Proposed Annual Hours**	**Annual kWh Saved**
Integer line number	Building Address	Floor fixture is on	Description of location that matches site map	Descriptive name for the usage group	# of existing fixtures	Code from Wattage Table	Watts/Fixt from Wattage Table	(Pre Watts/Fixt) * (Pre Fixt No.)	Pre-installation control device	Number of fixtures after retrofit	Code from Wattage Table	Watts/Fixt from Wattage Table	(Post Watts/Fixt) * (Post Fixt No.)	Post-installation control device	Pre kW/Space - Post kW/Space	Existing annual hours for the usage group	Proposed annual hours for the usage group	(PreFixt #*PreWatts/Fixt * Baseline Hrs) - (PostFixt#*PostWatts/Fixt * Proposed Hours)
68	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CUSTODIAL CLOSET (BY BOLER RM)		1	FU2LL	60	0.06	Breaker	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
69	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOLER ROOM CORRIDOR		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
70	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOILER ROOM		6	FU2LL	60	0.36	Wall Switch	6	FU2ILL-R	52	0.31	Occ Sensor	0.05	2,000	1,400	283
71	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BREAK ROOM (BY BOILER RM)		1	F44LL	118	0.12	Wall Switch	1	F44SSILL	96	0.10	Occ Sensor	0.02	2,000	1,400	102
72	50 Old Tuckahoe Road, Marmora, NJ 08230	1	STORAGE (BY 4)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
73	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 5		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
74	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 7		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
75	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 6		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
76	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
77	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 6)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
78	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
79	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 8)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
80	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CLOSET (BY 8)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
81	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 8		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
82	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 9		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
83	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 10		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
84	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 11		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
85	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 12		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
86	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 13		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
87	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM		5	F44LL	118	0.59	Wall Switch	5	F44SSILL	96	0.48	Occ Sensor	0.11	2,000	1,400	508
88	50 Old Tuckahoe Road, Marmora, NJ 08230	1	FACULTY ROOM STORAGE (W/ TANK)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
89	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 14		14	FU2LL	60	0.84	Wall Switch	14	FU2ILL-R	52	0.73	Occ Sensor	0.11	2,000	1,400	661
90	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 15		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
91	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 16		16	FU2LL	60	0.96	Wall Switch	16	FU2ILL-R	52	0.83	Occ Sensor	0.13	2,000	1,400	755
92	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
93	50 Old Tuckahoe Road, Marmora, NJ 08230	1	GIRLS RESTROOM (BY 14)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
94	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46		3	FU2LL	60	0.18	Wall Switch	3	FU2ILL-R	52	0.16	Occ Sensor	0.02	2,000	1,400	142
95	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 TOILET		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Occ Sensor	0.00	2,000	1,400	28
96	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 46 SHOWER		1	CFT40/1	46	0.05	Wall Switch	1	CFT40/1	46	0.05	Occ Sensor	0.00	2,000	1,400	28
97	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		2	F44LL	118	0.24	Wall Switch	2	F44SSILL	96	0.19	Occ Sensor	0.04	2,000	1,400	203
98	50 Old Tuckahoe Road, Marmora, NJ 08230	1	BOYS RESTROOM (BY 14,17)		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
99	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 17		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Occ Sensor	0.31	2,000	1,400	1,422
100	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 18		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Occ Sensor	0.31	2,000	1,400	1,422
101	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 19		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Occ Sensor	0.31	2,000	1,400	1,422
102	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 20		14	F44LL	118	1.65	Wall Switch	14	F44SSILL	96	1.34	Occ Sensor	0.31	2,000	1,400	1,422
103	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21		13	F44LL	118	1.53	Wall Switch	13	F44SSILL	96	1.25	Occ Sensor	0.29	2,000	1,400	1,321
104	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ART ROOM 21 KILN		7	FU2LL	60	0.42	Wall Switch	7	FU2ILL-R	52	0.36	Occ Sensor	0.06	2,000	1,400	330
105	50 Old Tuckahoe Road, Marmora, NJ 08230	1	ROOM 22		25	FU2LL	60	1.50	Wall Switch	25	FU2ILL-R	52	1.30	Occ Sensor	0.20	2,000	1,400	1,180
106	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR A		16	CFT40/1	46	0.74	Wall Switch	16	CFT40/1	46	0.74	Occ Sensor	0.00	2,000	1,400	442
107	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR B		21	F42LL	60	1.26	Wall Switch	21	F42SSILL	48	1.01	Occ Sensor	0.25	2,000	1,400	1,109
108	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR C&D		4	F42LL	60	0.24	Wall Switch	4	F42SSILL	48	0.19	Occ Sensor	0.05	2,000	1,400	211
109	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR E,F&G		12	F42LL	60	0.72	Wall Switch	12	F42SSILL	48	0.58	Occ Sensor	0.14	2,000	1,400	634
110	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM (BY FACULTY)		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
111	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		2	FU2LL	60	0.12	Wall Switch	2	FU2ILL-R	52	0.10	Occ Sensor	0.02	2,000	1,400	94
112	50 Old Tuckahoe Road, Marmora, NJ 08230	1	MECHANICAL ROOM STORAGE		1	FU2LL	60	0.06	Wall Switch	1	FU2ILL-R	52	0.05	Occ Sensor	0.01	2,000	1,400	47
113	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR H		19	F44LL	118	2.24	Wall Switch	19	F44SSILL	96	1.82	Occ Sensor	0.42	2,000	1,400	1,930
114	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR I		12	F44LL	118	1.42	Wall Switch	12	F44SSILL	96	1.15	Occ Sensor	0.26	2,000	1,400	1,219
115	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR J		6	F44LL	118	0.71	Wall Switch	6	F44SSILL	96	0.58	Occ Sensor	0.13	2,000	1,400	610
116	50 Old Tuckahoe Road, Marmora, NJ 08230	1	CORRIDOR K		4	F44LL	118	0.47	Wall Switch	4	F44SSILL	96	0.38	Occ Sensor	0.09	2,000	1,400	406
117	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Occ Sensor	1.44	2,000	1,400	3,571
118	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
119	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 1 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
120	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Occ Sensor	1.44	2,000	1,400	3,571
121	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
122	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 2 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
123	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Occ Sensor	1.44	2,000	1,400	3,571
124	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
125	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 3 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
126	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4		12	Custom Fixture 11	216	2.59	Wall Switch	24	F42SSILL	48	1.15	Occ Sensor	1.44	2,000	1,400	3,571
127	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 STORAGE		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
128	50 Old Tuckahoe Road, Marmora, NJ 08230	1	TRAILER ROOM 4 TOILET		1	I60/1	60	0.06	Wall Switch	1	CFT28/1	33	0.03	Occ Sensor	0.03	2,000	1,400	74
129	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 1		7	MV175/1	205	1.44	Light Sensor & Timer	7	MV175/1	205	1.44	Light Sensor & Timer	0.00	4,368	2,184	3,134
130	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL FIXTURE		11	I60/1	60	0.66	Light Sensor & Timer	11	CFT28/1	33	0.36	Light Sensor & Timer	0.30	2,000	1,400	812
131	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 2		2	HPS150/1	188	0.38	Light Sensor & Timer	2	HPS150/1	188	0.38	Light Sensor & Timer	0.00	2,000	1,400	226
132	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 3		12	MH250/1	295	3.54	Light Sensor & Timer	12	MH250/1	295	3.54	Light Sensor & Timer	0.00	4,368	2,184	7,731
133	50 Old Tuckahoe Road, Marmora, NJ 08230	1	EXTERIOR: WALL PACK 4		2	HPS250/1	295	0.59	Light Sensor & Timer	2	HPS250/1	295	0.59	Light Sensor & Timer	0.00	2,000	1,400	354
					873		**Total Pre kW**	**90.51**	**Total Post Fixt.**	**921**		**Total Pre kW**	**67.44**	**Total kW Saved**	**23.07**	**Total Annual kWh Saved**		**96,301.72**

Upper Township School District - NJBPU

CHA Project #24145
Upper Township Elementary School

Cost Table

		Material Cost ($/fixture)	Labor Cost ($/fixture)	Disposal Cost ($/fixture)	**Retrofit Cost ($/fixture)**	Quantity	Total Cost
Single fixture retrofit							
New electronic ballast installation		$42	$42	$0	$84		
New Super T8 lamp installation		$2	$4	$0	$6		
					$90		
Troffer lighting retrofit							
New electronic ballast installation		$42	$42	$0	$84	745	$62,600
New super T8 lamp installation		$24	$8	$0	$32	745	$24,100
	sub-total				**$116**		
Photo cell installation		$98	$53	$0	$150		
					$150		$86,700
Gym							
Existing MV fixture and lamp removal		$0	$0	$40	$40	24	$1,000
New Induction fixture and lamp installation		$550	$8	$0	$558	24	$13,400
	sub-total				**$598**		
Photo cell installation		$98	$53	$0	$150		
							$14,400
Incandescent lighting retrofit							
Existing incandescent bulb removal		$0	$0	$4	$4	46	$200
New compact fluorescent installation		$32	$4	$0	$36	46	$1,600
					$40		
Motion sensor installation		$100	$85	$0	$185	200	$37,000

APPENDIX D

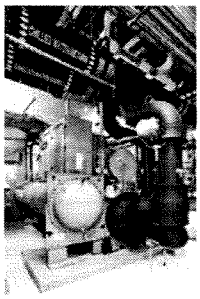
New Jersey Pay For Performance Incentive Program

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

Take a comprehensive, whole-building approach to saving energy in your existing facilities and earn incentives that are directly linked to your savings. Pay for Performance relies on a network of program partners who provide technical services under direct contract to you. Acting as your energy expert, your partner will develop an energy reduction plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and a construction schedule for installation.



Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following five customer classes are not required to meet the 100 kW demand in order to participate in the program: hospitals, public colleges and universities, 501(c)(3) non-profits, affordable multifamily housing, and local governmental entities. Your energy reduction plan must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more.

Exceptions to the 15% threshold requirement may be made for certain industrial, manufacturing, water treatment and datacenter building types whose annual energy consumption is heavily weighted on process loads. Details are available in the high energy intensity section of the FAQ page.

ENERGY STAR Portfolio Manager

Pay for Performance takes advantage of the ENERGY STAR Program with Portfolio Manager, EPA's interactive tool that allows facility managers to track and evaluate energy and water consumption across all of their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.

This rating system assesses building performance by tracking and scoring energy use in your facilities and comparing it to similar buildings. That can be a big help in locating opportunities for cost-justified energy efficiency upgrades. And, based on our findings, you may be invited to participate in the Building Performance with ENERGY STAR initiative and receive special recognition as an industry leader in energy efficiency.

Incentives

Pay for Performance incentives are awarded upon the satisfactory completion of three program milestones:

Incentive #1 - Submittal of complete energy reduction plan prepared by an approved program partner - Contingent on moving forward, incentives will be between $5,000 and $50,000 based on approximately $.10 per square foot, not to exceed 50% of the facility's annual energy expense.

Incentive #2 - Installation of recommended measures - Incentives are based on the projected level of electricity and natural gas savings resulting from the installation of comprehensive energy-efficiency measures.

Incentive #3 - Completion of Post-Construction Benchmarking Report - A completed report verifying energy reductions based on one year of post-implementation results. Incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum performance threshold of 15% savings has been achieved.

CONTACT US

A detailed Incentive Structure document is available on the applications and forms page.

Energy Efficiency Revolving Loan Fund (EE RLF)

New Jersey-based commercial, institutional or industrial entities (including 501(c)(3) organizations) that have received an approved energy reduction plan under Pay for Performance may be eligible for supplemental financing through the EE RLF. The financing, in the form of low-interest loans, can be used to support up to 80% of total eligible project costs, not to exceed $2.5 million or 100% of total eligible project costs from all public state funding sources. Visit the NJ EDA website for details.

Steps to Participation

Click here for a step-by-step description of the program.

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

New Jersey SmartStart BUILDINGS®

BPU

2012 PAY FOR PERFORMANCE PROGRAM
Existing Buildings Incentive Structure

Incentive #1: Energy Reduction Plan

Incentive Amount: ..... $0.10 per sq ft
Minimum Incentive: $5,000
Maximum Incentive:: ..... $50,000 or 50% of facility annual energy cost (whichever is less)

This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP) and is paid upon ERP approval. Incentive is contingent on implementation of recommended measures outlined in the ERP.

Incentive #2: Installation of Recommended Measures

Minimum Performance Target: 15%

Electric Incentives

Base Incentive based on 15% savings: ..... $0.09 per projected kWh saved
For each % over 15% add: ..... $0.005 per projected kWh saved
Maximum Incentive: ..... $0.11 per projected kWh saved

Gas Incentives

Base Incentive based on 15% savings: ..... $0.90 per projected Therm saved
For each % over 15% add: ..... $0.05 per projected Therm saved
Maximum Incentive: ..... $1.25 per projected Therm saved

Incentive Cap: ..... 25% of total project cost

This incentive is based on projected energy savings outlined in the ERP. Incentive is paid upon successful installation of recommended measures.

Incentive #3: Post-Construction Benchmarking Report

Minimum Performance Target: 15%

Electric Incentives

Base Incentive based on 15% savings: ..... $0.09 per actual kWh saved
For each % over 15% add: ..... $0.005 per actual kWh saved
Maximum Incentive: ..... $0.11 per actual kWh saved

Gas Incentives

Base Incentive based on 15% savings: ..... $0.90 per actual Therm saved
For each % over 15% add: ..... $0.05 per actual Therm saved
Maximum Incentive: ..... $1.25 per actual Therm saved

Incentive Cap: ..... 25% of total project cost

This incentive will be released upon submittal of a Post-Construction Benchmarking Report that verifies that the level of savings actually achieved by the installed measures meets or exceeds the minimum performance threshold. To validate the savings and achievement of the Energy Target, the EPA Portfolio Manager shall be used. Savings should be rounded to the nearest percent. Total value of Incentive #2 and Incentive #3 may not exceed 50% of the total project cost. Incentives will be limited to $1 million per gas and electric account per building; maximum of $2 million per project. See Participation Agreement for details.

Upper Township School District - NJBPU
CHA Project #24145
Upper Township Elementary School

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2010.
Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
Values used in this calculation are for measures with a positive return on investment (ROI) only.

Total Building Area (Square Feet)	69,607
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

Incentive #1		
Audit not funded by NJ BPU	$0.10	$/sqft
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$68,951	$23,485
Existing Usage (from utility)	469,500	23,579
Proposed Savings	232,866	-1,405
Existing Total MMBtus	3,960	
Proposed Savings MMBtus	654	
% Energy Reduction	**16.5%**	
Proposed Annual Savings	$31,500	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm
Incentive #2	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.10	$0.98
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.10	$0.98

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$3,480
Incentive #2	$22,730	-$1,371	$21,358
Incentive #3	$22,730	-$1,371	$21,358
Total All Incentives	**$45,459**	**-$2,742**	**$46,197**

Total Project Cost	$263,000

		Allowable Incentive
% Incentives #1 of Utility Cost*	3.8%	$3,480
% Incentives #2 of Project Cost**	8.1%	$21,358
% Incentives #3 of Project Cost**	8.1%	$21,358
Total Eligible Incentives***	**$37,800**	
Project Cost w/ Incentives	$225,200	

Project Payback (years)	
w/o Incentives	w/ Incentives
8.3	7.1

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 30% of total project cost.
Maximum allowable amount of Incentive #3 is 20% of total project cost.

*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account

APPENDIX E

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

02 - Upper Township Elementary School Solar PV ECM

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	50.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	38.5 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.7 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ^{2}/day)	AC Energy (kWh)	Energy Value ($)
1	3.36	4139	608.43
2	4.05	4469	656.94
3	4.58	5422	797.03
4	4.84	5299	778.95
5	5.30	5838	858.19
6	5.33	5506	809.38
7	5.27	5561	817.47
8	5.25	5503	808.94
9	5.06	5338	784.69
10	4.46	5027	738.97
11	3.15	3588	527.44
12	2.87	3460	508.62
Year	4.46	59150	8695.05

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

RReDC Return to RReDC home page (http://www.nrel.gov/rredc)

Cautions for Interpreting the Results

The monthly and yearly energy production are modeled using the PV system parameters you selected and weather data that are typical or representative of long-term averages. For reference, or comparison with local information, the solar radiation values modeled for the PV array are included in the performance results.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by ± 30% for monthly values and ± 10% for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors* (*http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/*).

For these variations and the uncertainties associated with the weather data and the model used to model the PV performance, future months and years may be encountered where the actual PV performance is less than or greater than the values shown in the table. The variations may be as much as 40% for individual months and up to 20% for individual years. Compared to long-term performance over many years, the values in the table are accurate to within 10% to 12%.

If the default overall DC to AC derate factor is used, the energy values in the table will overestimate the actual energy production if nearby buildings, objects, or other PV modules and array structure shade the PV modules; if tracking mechanisms for one- and two-axis tracking systems do not keep the PV arrays at the optimum orientation with respect to the sun's position; if soiling or snow cover related losses exceed 5%; or if the system performance has degraded from new. (PV performance typically degrades 1% per year.) If any of these situations exist, an overall DC to AC derate factor should be used with PVWATTS that was calculated using system specific component derate factors for *shading*, *sun-tracking*, *soiling*, and *age*.

The PV system size is the nameplate DC power rating. The energy production values in the table are valid only for crystalline silicon PV systems.

The cost savings are determined as the product of the number of kilowatt hours (kWh) and the cost of electricity per kWh. These cost savings occur if the owner uses all the electricity produced by the PV system, or if the owner has a net-metering agreement with the utility. With net-metering, the utility bills the owner for the net electricity consumed. When electricity flows from the utility to the owner, the meter spins forward. When electricity flows from the PV system to the utility, the meter spins backwards.

If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

Besides the cost savings shown in the table, other benefits of PV systems include greater energy independence and a reduction in fossil fuel usage and air pollution. For commercial customers, additional cost savings may come from reducing demand charges. Homeowners can often include the cost of the PV system in their home mortgage as a way of accommodating the PV system's initial cost.

To accelerate the use of PV systems, many state and local governments offer financial incentives and programs. Go to http://www.nrel.gov/stateandlocal for more information.

APPENDIX F

Solar Thermal Domestic Hot Water Plant

Upper Township Elementary School
Solar DHW Plant

Home
What Can I Do?
Electric Choice
Home Energy
FAQs

LEARN
Fact Sheets
Lesson Plans

PLAY
Calculators

NETWORK
Organizations
Businesses
Events Calendar

BROWSE
Resources
Solar
Wind
Biomass
Geothermal
Water

Projects

TX Energy - Past and Present

Financial Help

About Us

About SECO

RARE

Interactive Energy Calculators

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

Our calculators help you understand energy production and consumption in a whole new way. Use them to develop a personal profile of your own energy use.

Carbon Pollution Calculator
Electric Power Pollution Calculator
PV System Economics
Solar Water Heating
What's a Watt?

Solar Water Heating Calculator

Water heating is a major energy consumer. Although the energy consumed daily is often less than for air conditioning or heating, it is required year round, making it a good application of solar energy. Use this calculator to explore the energy usage of your water heater, and to estimate whether a solar water heater could save you money.

Water Heater Characteristics			
Physical		**Thermal**	
? Diameter (feet)	2	? Water Inlet Temperature (Degrees F)	60
? Capacity (gallons)	175	? Ambient Temperature (Degrees F)	75
? Surface Area (calculated - sq ft)	53.07	? Hot Water Temperature (Degrees F)	140
? Effective R-value	5	? Hot Water Usage (Gallons per Day)	1000
Energy Use			
27370		? Heat Delivered in Hot Water (BTU/hr)	
689.9		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0.7647	? Overall Efficiency	0.9559
0.784	? Conversion Efficiency	0.98
35790 BTU/hr	? Power Into Water Heater	28630 BTU/hr
Cost		
$ 1 /Therm	? Utility Rates	$ 0.162 /kWh
$ 3135.204	? Yearly Water Heating Cost	$ 11899.33

How Does Solar Compare?		
? Solar Water Heater Cost: $ 22900		? Percentage Solar: 70
10.43449 years for gas	? Payback Time for Solar System	2.749252 years for electric

More information on solar water heating:

Fact sheet - Solar Water Heaters
Fact sheet - Solar Water Heaters for Swimming Pools
Kids fact sheet - Heat from the Sun

Return to Top of Page

APPENDIX G

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Upper Township Elementary School

Building ID: 2923503
For 12-month Period Ending: January 31, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 08, 2012

Facility
Upper Township Elementary School
50 Old Tuckahoe Road
Marmora, NJ 08223

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1952
Gross Floor Area (ft²): 69,607

Energy Performance Rating[2] (1-100) 98

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,565,221
Natural Gas (kBtu)[4]	24,099
Total Energy (kBtu)	1,589,320

Energy Intensity[4]

Site (kBtu/ft²/yr)	23
Source (kBtu/ft²/yr)	75

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	223

Electric Distribution Utility
Atlantic City Electric Co [Pepco Holdings Inc]

National Median Comparison

National Median Site EUI	52
National Median Source EUI	171
% Difference from National Median Source EUI	-56%
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[5] **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. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Upper Township Elementary School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	50 Old Tuckahoe Road, Marmora, NJ 08223	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	69,607 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	283	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	70 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co [Pepco Holdings Inc]

Fuel Type: Electricity		
Meter: 0361 1239 9997-E (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
01/01/2012	01/31/2012	37,200.00
12/01/2011	12/31/2011	33,300.00
11/01/2011	11/30/2011	35,400.00
10/01/2011	10/31/2011	30,600.00
09/01/2011	09/30/2011	33,300.00
08/01/2011	08/31/2011	32,400.00
07/01/2011	07/31/2011	28,800.00
06/01/2011	06/30/2011	23,700.00
05/01/2011	05/31/2011	35,400.00
04/01/2011	04/30/2011	30,900.00
03/01/2011	03/31/2011	36,900.00
02/01/2011	02/28/2011	39,000.00
0361 1239 9997-E Consumption (kWh (thousand Watt-hours))		**396,900.00**
0361 1239 9997-E Consumption (kBtu (thousand Btu))		**1,354,222.80**
Meter: 0361 1259 9992-E (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
01/01/2012	01/31/2012	10,000.00
12/01/2011	12/31/2011	7,760.00
11/01/2011	11/30/2011	5,360.00
10/01/2011	10/31/2011	1,520.00
09/01/2011	09/30/2011	1,200.00
08/01/2011	08/31/2011	2,560.00
07/01/2011	07/31/2011	4,160.00
06/01/2011	06/30/2011	3,840.00
05/01/2011	05/31/2011	5,440.00
04/01/2011	04/30/2011	4,080.00
03/01/2011	03/31/2011	6,800.00
02/01/2011	02/28/2011	9,120.00
0361 1259 9992-E Consumption (kWh (thousand Watt-hours))		**61,840.00**

0361 1259 9992-E Consumption (kBtu (thousand Btu))	**210,998.08**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**1,565,220.88**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas

Meter: 40552 0066 09-G (cf (cubic feet))
Space(s): Entire Facility

Start Date	End Date	Energy Use (cf (cubic feet))
01/01/2012	01/31/2012	4,980.00
12/01/2011	12/31/2011	4,540.00
11/01/2011	11/30/2011	3,270.00
10/01/2011	10/31/2011	1,830.00
09/01/2011	09/30/2011	40.00
08/01/2011	08/31/2011	10.00
07/01/2011	07/31/2011	20.00
06/01/2011	06/30/2011	10.00
05/01/2011	05/31/2011	30.00
04/01/2011	04/30/2011	220.00
03/01/2011	03/31/2011	3,500.00
02/01/2011	02/28/2011	4,970.00

40552 0066 09-G Consumption (cf (cubic feet))	**23,420.00**
40552 0066 09-G Consumption (kBtu (thousand Btu))	**24,099.18**
Total Natural Gas Consumption (kBtu (thousand Btu))	**24,099.18**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

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

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Upper Township Elementary School
50 Old Tuckahoe Road
Marmora, NJ 08223

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Upper Township Elementary School	
Gross Floor Area Excluding Parking: (ft^2)	69,607
Year Built	1952
For 12-month Evaluation Period Ending Date:	January 31, 2012

Facility Space Use Summary

School	
Space Type	K-12 School
Gross Floor Area (ft^2)	69,607
Open Weekends?	No
Number of PCs	283
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	70
Percent Heated	100
Months ◦	12
High School?	No
School District ◦	Upper Township School District

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 01/31/2012)	**Baseline** (Ending Date 07/31/2011)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	98	97	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	23	24	40	N/A	52
Source ($kBtu/ft^2$)	75	80	133	N/A	171
Energy Cost					
$/year	$ 92,007.11	$ 104,419.46	$ 162,533.80	N/A	$ 207,832.09
$/$ft^2$/year	$ 1.32	$ 1.50	$ 2.33	N/A	$ 2.98
Greenhouse Gas Emissions					
$MtCO_2e$/year	223	238	394	N/A	504
$kgCO_2e/ft^2$/year	3	3	5	N/A	7

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

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

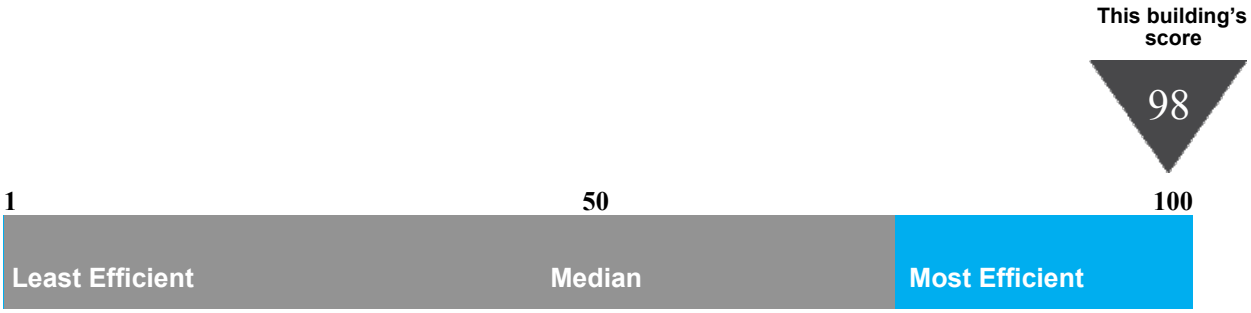
Statement of Energy Performance

2012

Upper Township Elementary School
50 Old Tuckahoe Road
Marmora, NJ 08223

Portfolio Manager Building ID: 2923503

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 75 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2012

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 06/08/2012