CHERRY HILL
PUBLIC SCHOOLS

LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

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TABLE OF CONTENTS

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I. EXECUTIVE SUMMARY

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

Cherry Hill
Johnson School
500 Kresson Road
Cherry Hill, NJ 08034

Municipal Contact Person: James Devereaux
Facility Contact Person: Kevin Larsen

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

The annual energy costs at this facility are as follows:

Electricity	$ 41,483
Natural Gas	$ 34,012
Total	$ 75,495

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM's are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Computer Monitor Replacement	$3,000	$857	3.5	42.8%
ECM #2	Condensing Boiler Installation	$188,166	$4,966	37.9	-7.6%
ECM #3	Condensing Hot Water Heater Installation	$2,314	$18	128.6	-90.7%
ECM #4	Window AC Unit Replacement	$625	$71	8.8	13.6%
ECM #5	AC Unit Replacement	$61,359	$2,370	25.9	-42.1%
ECM #6	Low Flow WC & Urinals	$52,647	$139	378.8	-92.1%
ECM #7	Lighting Upgrade	$3,890	$1,482	2.6	471.5%
ECM #8	Lighting Controls	$6,830	$1,370	5.0	200.9%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar PV System	$842,720	$66,924	12.6	98.5%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Computer Monitor Replacement	1.5	5040	0
ECM #2	Condensing Boiler Installation	0.0	0	3355
ECM #3	Condensing Hot Water Heater Installation	0.0	0	12
ECM #4	Window AC Unit Replacement	0.4	348	0
ECM #5	AC Unit Replacement	14.6	8097	0
ECM #6	Low Flow WC & Urinals	0.0	0	0
ECM #7	Lighting Upgrade	3.1	8393	0
ECM #8	Lighting Controls	0.0	8060	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar PV System	85.3	128701	0
Notes:	A. Demand Savings for Renewable Energy Measures fluctuate with the seasons and are estimated based on the demand the Photovoltaic System will produce.			

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #1:** Computer Monitor Replacement
- **ECM #4:** Window AC Unit Replacement
- **ECM #7:** Lighting Upgrade
- **ECM #8:** Lighting Controls

The ECMs above represent investments that can be fully funded simply by the energy savings. These ECMs provide instantaneous value for the facility by reducing the operating costs and improving overall function of the building operations. The CRT to LCD monitor replacement provides approximately three to four times less energy consumption while at the same time providing other benefits such as better picture quality, desk space, and overall functionality. Upgrades such as the lighting upgrades not only save energy, but also provide better quality light and help to standardize the district's replacement bulbs and ballasts to simplify replacement orders and maintenance. Lighting Controls provide very fast paybacks when considering many of the spaces are often lit for far more hours than the spaces are occupied. New window AC units that replace older units throughout the school provide energy savings as well as improved noise levels within the classrooms.

In addition to the fast payback ECMs, CEG recommends implementing ECMs with longer paybacks where the equipment is at the end of its rated life and the district is already considering replacement of that equipment. The longer payback ECMs such as AC unit replacements, condensing boilers, and condensing hot water heaters, are sometimes difficult to justify the up-front cost based on the energy savings alone. Installed costs are much easier to justify when looking at the net increase in installed cost for high efficiency equipment versus standard efficiency. It is important to note that the calculations for the equipment replacements is an estimate for the total installed cost without any "avoided costs" included. When equipment is replaced due to end of life cycle, the savings from the purchase of high efficiency equipment over standard efficiency equipment becomes more easily justified. It is highly recommended to utilize the ECMs (including the long payback ECMs) as a standard for energy efficiency for all future equipment replacement at Johnson Elementary School.

A solar photovoltaic (PV) system installation was evaluated for this facility. A solar PV system could provide a 6.8% internal rate of return for an $843,000 project. REMs such as this should be considered as investments of capital for the school district. Inherently solar PV systems do not provide additional savings through "avoided cost," however the investment in renewable can be very financially beneficial none the less. The solar PV system calculation is based on a 100% owner purchased system. If grants become available as well as additional funding, a solar PV system could prove to become an even greater investment for the BOE.

The ECMs and REMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. There are maintenance and operational measures that

can provide significant energy savings and provide immediate benefit. The maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

2. Maintain all weather stripping on windows and doors.

3. Clean all light fixtures to maximize light output and limit the use of task lighting.

4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

5. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to "screen saver" mode which saves the screen life, not energy.

6. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

7. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to "screen saver" mode which saves the screen life, not energy.

8. Minimize operation of air conditioning for unoccupied spaces. The 2000 building addition appeared to be cooling while classrooms were unoccupied.

9. Repair units that are not operating correctly. The Trane rooftop AC unit serving the teacher's lounge was cycling off on high head pressure due to the condenser fan being frozen. This cycling can account for significant energy waste and damage to the air conditioning unit.

Overall, Johnson School is currently above average with respect to its energy efficiency compared to other schools in the region. The energy star rating for this facility is 67 out of 100 where 50 is representing the average rating for K-12 schools. This score is difficult to achieve and represents a considerable effort by the staff to maintain an energy efficient building. Significant energy savings can be achieved by simply turning off HVAC equipment, lightings, and plug loads when not in use or spaces are unoccupied. Additional savings is available through the conscience attention to AC temperature set points, etc. Additional savings are still available however through the implementation of the above recommended measures. With these ECMs, Cherry Hill BOE will realize further energy savings and further improve its overall performance.

If all ECMs under 10 years are implemented (assuming 9 window AC units replaced), the total project would be approximately $19,000 installed with a simple payback of 4.4 years. This project represents an 10% reduction in electric utility costs, as well as 19.5 Ton reduction of CO2 pollution annually. It is highly recommended to proceed with the implementation of all ECMs that are financially feasible for the BOE.

II. INTRODUCTION

The comprehensive energy audit covers the 51,550 square foot Elementary School, which includes the following spaces: Boiler Rooms, Classrooms, Administrative Areas, Library, Multi-Purpose Room, and Corridors.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved. If multiple ECM's are recommended to be implemented, the combined savings is calculated and identified appropriately.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated base on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$Simple\ Payback = \left(\frac{Net\ Cost}{Yearly\ Savings} \right)$$

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

$$Simple\ Lifetime\ ROI = \frac{(Simple\ Lifetime\ Savings - Net\ Cost)}{Net\ Cost}$$

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

$$Internal\ Rate\ of\ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + IRR)^n} \right)$$

$$Net\ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + DR)^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Public Service Electric and Gas (PSE&G) provides electricity to the facility under their General Lighting and Power Service rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. Public Service Electric and Gas (PSE&G) provides natural gas to the facility under the Large Volume Gas Service rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	17.0¢ / kWh
Natural Gas	$1.48 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G
Rate: GLP
Meter No: 278006131
Account No: Meter 1: 6183605018 (Jan.-March), 6558537109 (April-Dec.) / Meter 2: 6183633801 (Jan.-March), 6732428101 (April-Dec.)
Third Party Utility Provider: South Jersey Energy Company (May through Dec)
TPS Meter / Acct No:

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	18,407	73.4	$2,989
Feb-09	21,512	72.0	$3,465
Mar-09	20,161	71.6	$3,294
Apr-09	23,403	69.3	$3,617
May-09	22,907	104.9	$3,485
Jun-09	18,857	104.9	$3,820
Jul-09	16,697	95.9	$3,418
Aug-09	19,396	111.2	$3,979
Sep-09	21,017	106.2	$4,153
Oct-09	19,307	82.8	$2,931
Nov-09	20,252	75.2	$3,027
Dec-09	22,368	73.4	$3,305
Totals	**244,284**	**111.2 Max**	**$41,483**

AVERAGE DEMAND **86.7 KW average**
AVERAGE RATE **$0.170** **$/kWh**

Figure 1
Electricity Usage Profile

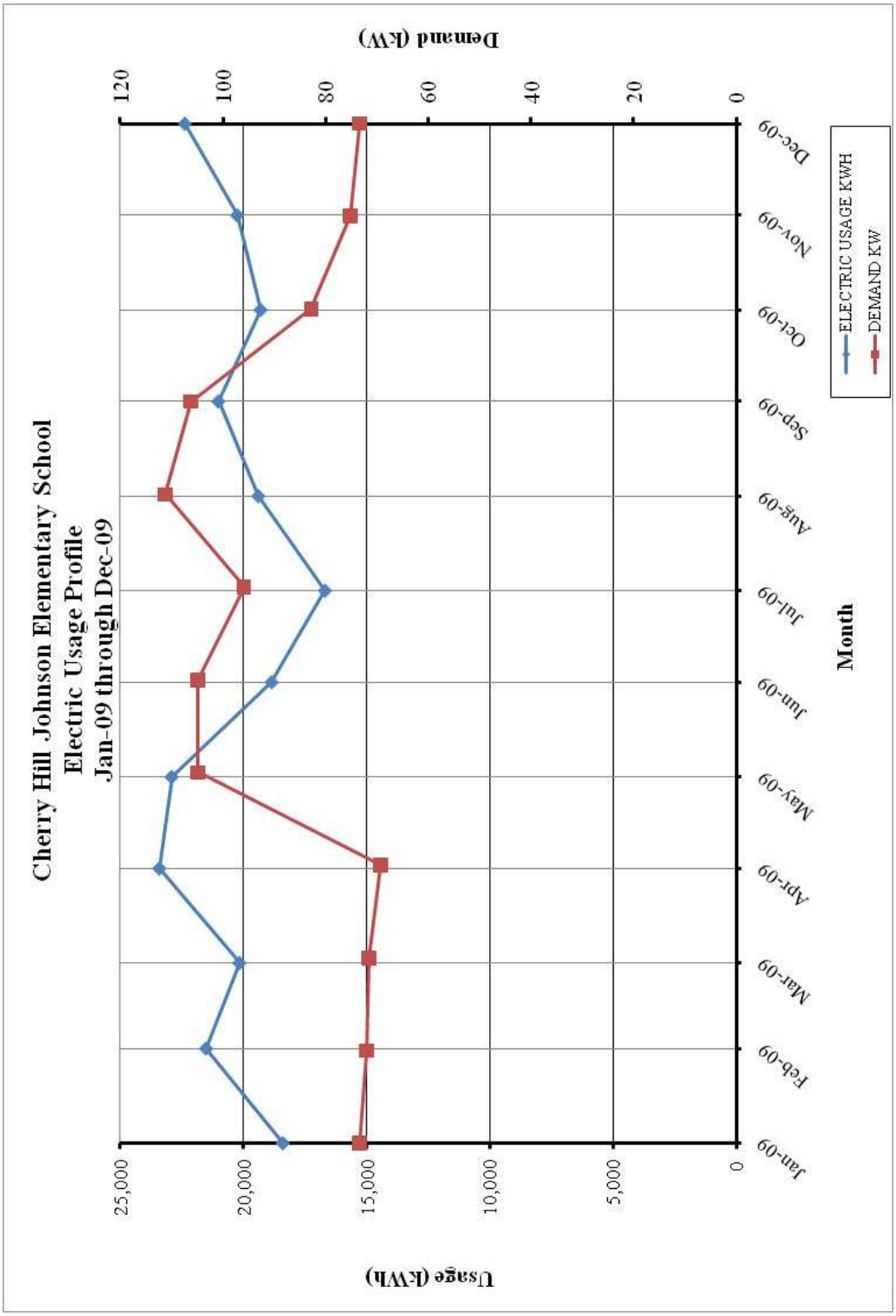


Table 4
Natural Gas Billing Data

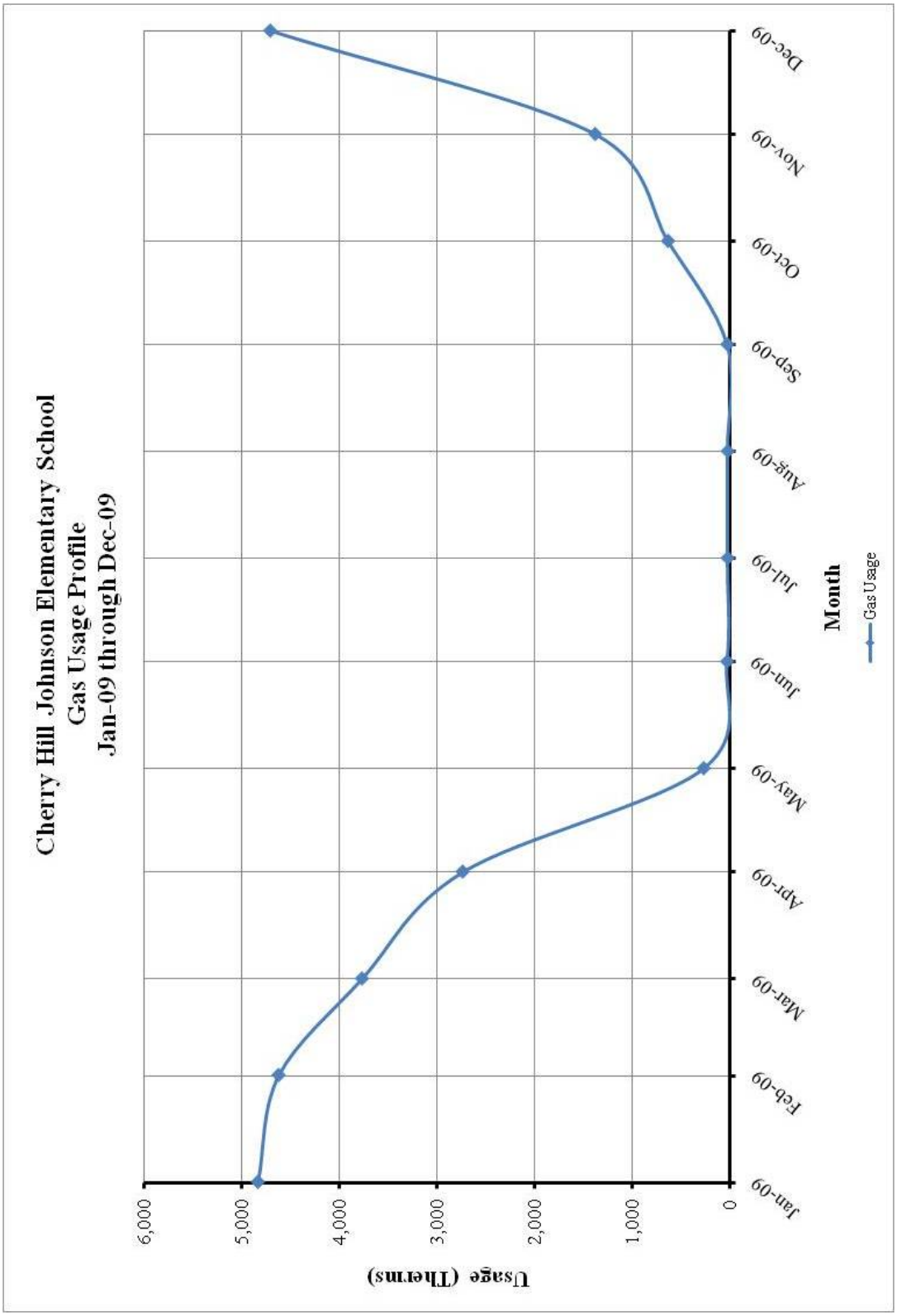
NATURAL GAS USAGE SUMMARY

Utility Provider: PSE&G
Rate: LVG
Meter No: 2523489
Account No: 6183605018 (Jan.-March), 6558537109 (April-Dec.)
Third Party Utility Provider: Hess Corporation
TPS Meter No:

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jan-09	4,829.54	$7,368.25
Feb-09	4,617.99	$7,077.38
Mar-09	3,765.30	$5,903.28
Apr-09	2,733.91	$3,616.84
May-09	269.56	$444.74
Jun-09	28.61	$131.02
Jul-09	23.11	$123.85
Aug-09	23.11	$123.96
Sep-09	26.48	$128.43
Oct-09	633.74	$921.26
Nov-09	1,379.83	$2,301.14
Dec-09	4,703.28	$5,872.64
TOTALS	**23,034.45**	**$34,012.79**

AVERAGE RATE: **$1.48** **$/THERM**

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$Building\ \ Site\ EUI = \frac{(Electric\ Usage\ in\ kBtu + Gas\ Usage\ in\ kBtu)}{Building\ \ Square\ \ Footage}$$

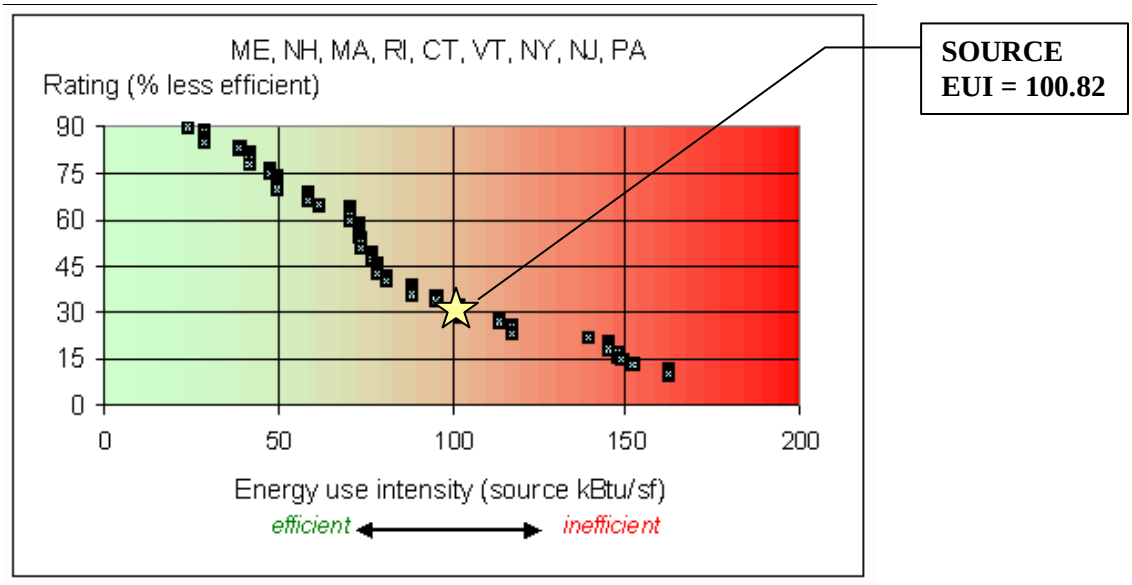
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	244284.0			833,986	3.340	2,785,512
NATURAL GAS		23034.4		2,303,445	1.047	2,411,707
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				3,137,430		5,197,219
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		51,550	SQUARE FEET			
BUILDING SITE EUI		*60.86*	kBtu/SF/YR			
BUILDING SOURCE EUI		*100.82*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of Elementary Schools.

Figure 3
Source Energy Use Intensity Distributions: Elementary Schools



Based on the information compiled for the studied facility, as compared to the national average the energy usage is in the 25th percentile for energy efficiency compared to the baseline data.

C. EPA Energy Benchmarking System

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

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

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login

User Name: cherryhillpublicschools
Password: lgeaceg2009

Security Question: "What is your birth city?"
Security Answer: "Cherry Hill"

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Johnson School	67	50

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 51,550 SF Elementary School was built in 1966. Since the original construction an addition was added in 1994 which consisted of 2 classrooms. In 2000 another addition was added to the building which consisted of 5 classrooms and a bathroom group. The typical hours of operation for this facility are between 7:00 AM and 6:30 PM. The school enrollment is approximately 449 students and 41 teachers. The building envelope consists of block wall construction with brick facing. The insulation within the wall structure is unknown, however it is estimated at a minimum that the wall construction includes an air space for the original portion of the building. The 2000 addition is estimated to have 1"-2" of insulation within the wall construction. The windows throughout the building are primarily double pane windows installed as part of a recent renovation throughout the school. Some sections of the original building still have older single pane windows, however the area is minimal. Overall the windows are in good condition. All windows frame are aluminum. The windows include shades to reduce glare and overall heat gain in the cooling season. Weather stripping and overall envelope seals are in good condition. The roof is constructed of a built up roof system with crushed stone topping. The insulation thickness below the roof membrane is unknown (estimated to be 1-2" thick.) The building roof is in good condition.

HVAC Systems

The central heating system consists of an HB Smith sectional cast iron boiler that serves the building's heating hot water loop. The boiler was originally dual fuel capable with oil back-up, however the oil tank been removed. The boiler water is circulated throughout the building by two base mounted end suction pumps made by Bell & Gossett. These pumps are constant volume and in fair / poor condition. The 2000 building addition includes a small boiler plant made up of two modular style boilers made by A.O. Smith – Burkay Genesis. This boiler plant is dedicated for the 2000 addition. The boiler water is circulated throughout the addition by two inline 3 HP pumps. All central heating equipment within the 2000 addition mechanical room appears to be in good condition.

Terminal heating equipment throughout the original portion of the building includes unit ventilators made by Nesbitt in conjunction with fin-tube baseboard radiators for perimeter heating. The unit ventilators include hot water coils fed from the boiler water loop. The unit ventilators are old and in many cases very dirty from dust and debris. Although the overall condition of these units is poor, there is little energy savings related with its replacement since the heating system efficiency is based on the central boilers and hot water pumps. A portion of the building as part of the 1994 renovation utilizes packaged unit ventilators that include cooling as well as heating from the central boiler loop. The cafeteria / auditorium is located within the original building and utilizes air handling units with hot water coils for heating. These units are in fair condition. The 2000 building addition includes split systems made by AAON with hot water coils fed from the 2000 addition mechanical room. These units are used to provide heating for the 2000 addition classrooms and hallway. They are in fair condition.

Cooling is provided for the majority of the building. The original portion of the building including; most classrooms, administration offices, and library are cooled by window AC units, packaged rooftop units, or split systems. The window AC units range from old units in fair/poor

condition, to new and in good condition. The packaged rooftop heat pump unit made by Trane provides heating and cooling for the Teacher's lounge. The packaged heat pump unit is in very poor condition and was noted to be cycling the compressor off on high head pressure. The split systems serving the front office is operating correctly and appears to be in fair condition. The split system serving the library appear to be old and in poor condition. The 2000 building addition includes central cooling for all spaces with ducted split systems dedicated for each classroom as well as an additional system dedicated for the hallway. These units are made by AAON with DX cooling coils and remote condensing units which are in fair condition.

HVAC Controls

The heating system is controlled by a central control system made by Honeywell. The control system was added after the original installation of the heating system and therefore includes a relay panel that converts the DDC control signals to the original pneumatic system. The controls provide schedules for operation of the heating and cooling systems including boilers, pumps, unit ventilators, and AC systems. In some areas the cooling systems were noted to be running without occupants that would require cooling. The controls also include monitoring of the outside air temperature, air compressor, supply water temperature, etc.

Exhaust System

Air is exhausted from the classrooms and toilet rooms through roof exhausters. The toilet room exhaust fans are operated based on wall switches. The general exhaust for the classroom is controlled based on the facility occupancy schedule. The exhaust fans range in size and overall condition. All exhaust fans are operated with small power motors.

Domestic Hot Water

Domestic hot water for the original building restrooms, office lounge, and cafeteria kitchen is provided by a 100 gallon condensing style domestic gas fired hot water heater made by AO Smith located in the original building boiler room. This hot water heater is in excellent condition. The stand alone tank type hot water heater is used for the domestic hot water for all seasons, however it was noted that the boiler loop includes a water to water heat exchanger capable of producing domestic hot water from the boiler loop in lieu of the hot water heater. The 2000 addition utilizes a 48 gallon tank type natural gas fired hot water heater made by AO Smith. The 2000 addition hot water heater is a standard efficiency hot water heater in good condition.

Lighting

Lighting throughout the building comprised of a mixture of T-8 fluorescent fixtures with electronic ballasts and T-12 fluorescent fixtures with magnetic ballasts. The lighting systems do not include standard bulbs or ballasts throughout the building. In some cases, T-12 bulbs have been retrofitted with electronic ballasts in lieu of the original magnetic ballasts. All lighting is manually controlled in the building with the exception of the some areas within the new addition to the building. See the **Investment Grade Lighting Audit Appendix** for details.

Electrical Distribution System and Load Imbalance Testing

The electrical service for this facility is provided by three utility pole mounted transformers. The transformers supply 208/120v, 3PH power. The main power feed is supplied to an 800 amp main distribution panel (MDP) made by Square D which is located in the main electrical room. The 800 amp MDP panel is original equipment and is in serviceable condition. The MDP supplies power throughout the school to various sub-panels which are generally broken down into "lighting" and "power". There are also sub-panels providing power to mechanical equipment. Several newer panels made by Square D and GE have been added to accommodate computer loads and additions. The building does not require transformers since the incoming power is already 208/120v. Transformers incur losses when converting differing voltages due to inefficiencies in the conversion process. No efficiency changes are anticipated by the replacement of electrical distribution equipment.

208/120v 3 Phase power is supplied to the MDP and distributed to all sub-panels in the building. This voltage is used for all equipment, lighting and plug loads (power) in the building. Equipment loads, lighting, and plug loads are primarily fed through branch panels of various size and manufacturer including Square D and GE.

As required by the project scope of work, CEG has performed testing on the facility's existing main power distribution to document any load imbalances utilizing actual field measurements. Field data was recorded from 3:13 PM, June 18th, 2010 through 2:19 PM, June 21st, 2010. The electrical testing data is included in the **Load Imbalance Testing Appendix**. As a result of the testing, it was found that Johnson Elementary School has an overall load imbalance of 10% at 86% of the capacity of the incoming utility transformer. See the attached appendix for the testing details.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located in the offices, computer labs, lounges, and classrooms. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that in some conditions the computers were left on and allowed to run 24 / 7, while in other rooms the computers were shut down. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on manufacture's specifications.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the school. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the school employees. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors:	30
Weeks per Yr:	40
Hrs per Week:	84 (12 hrs per day cumulative average)

$$Electric\,Usage = \frac{\#\,of\ \ Computers \times Monitor\ \ Power\,(W) \times Operation\,(Hrs)}{1000\left(\frac{W}{KW}\right)}$$

$$Energy\ Cost = Electric\,Usage(kWh) \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	30	30	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	84	84	
Operating Weeks per Yr	40	40	
Elec Cost ($/kWh)	0.170	0.170	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Usage (kWh)	7,560	2,520	5,040
Energy Cost ($)	$1,285	$428	$857
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours based on estimated average.		

Installation cost of new monitors is estimated based on current pricing for a 17" LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be $100.

Installation Costs: # Monitors X Cost per Monitor
30 Monitors X $100 per Monitor
$3000

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$3,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$857
Total Yearly Savings ($/Yr):	$857
Estimated ECM Lifetime (Yr):	5
Simple Payback	3.5
Simple Lifetime ROI	42.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$4,285
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	$924.81

ECM #2: Condensing Boiler Installation

Description:

The existing cast iron boiler is used as the primary source of heat for the original building. The existing boiler was installed during the original building construction and is 9 years past the service life of a typical cast iron boiler. The equipment appears to be maintained in fair operating condition. However, for boilers that are close to the end of its life it is difficult to predict the point at which the boiler becomes inoperable. With the increased efficiency of the condensing boilers, the savings can be substantial.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The existing boiler's efficiency is approximately 75%, which makes the condensing boiler a 13% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of two condensing gas fired boilers to replace the existing sectional boiler located in the original boiler room. The basis for this ECM is Aerco, Benchmark BMK-3.0LN-2 condensing boiler or equivalent. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

Baseline Hot Water Gas Use: 27.55 Therms (Ave from June & September Gas Use)

Existing Heating Natural Gas: 22,988.24 Therms – (27.55 Therms X 10 Months)
22,712.74 Therms (Sept through June Use - Baseline)

$$Bldg\ Heat\ \mathrm{Re}quired = Existing\ Nat\ Gas\ (Therms) \times Heating\ Eff.(\%) \times Fuel\ HeatValue\left(\frac{BTU}{Therm}\right)$$

$$\mathrm{Pr}oposed\ Heating\ Gas\ Usage = \frac{Bldg\ Heat\ \mathrm{Re}quired\ (BTU)}{Heating\ Eff.(\%) \times Fuel\ Heat\ Value\left(\frac{BTU}{Therm}\right)}$$

$$Energy\ Cost = Heating\ Gas\ Usage(Therms) \times Ave\ Fuel\ Cost\left(\frac{\$}{Therm}\right)$$

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Boiler	New Condensing Boilers	
Existing Nat Gas (Therms)	22,713	0	
Boiler Efficiency (%)	75%	88%	13%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	1,703	1,703	
Gas Cost ($/Therm)	1.48	1.48	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	22,713	19,357	3,355
Energy Cost ($)	$33,615	$28,649	$4,966
COMMENTS:			

Installation cost of the two new 3,000 MBH condensing boilers, demolition, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be $194,166.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: $1.00 per MBH.

$$\text{Smart Start®}\ Incentive = 2 \times (Boiler\ MBH \times\ \$1.00) = 2 \times (3{,}000 \times \$1.00) = \$6{,}000$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$194,166
NJ Smart Start Equipment Incentive ($):	$6,000
Net Installation Cost ($):	$188,166
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,966
Total Yearly Savings ($/Yr):	$4,966
Estimated ECM Lifetime (Yr):	35
Simple Payback	37.9
Simple Lifetime ROI	-7.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$173,810
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($81,460.47)

ECM #3: Condensing Domestic Hot Water Heater

Description:

Domestic hot water for the original building restrooms, office lounge, and cafeteria kitchen is provided by a 100 gallon condensing style domestic gas fired hot water heater made by AO Smith located in the original building boiler room. This hot water heater is in excellent condition. The 2000 addition utilizes a 48 gallon tank type natural gas fired hot water heater made by AO Smith. The 2000 addition hot water heater is a standard efficiency hot water heater in good condition

This ECM includes installation of a new central tank type condensing hot water heater to replace the existing standard efficiency gas fired hot water heater in the 2000 addition. The basis for this ECM is an AO Smith condensing hot water heater model number BTX. The number of people served by the water heater is based on estimated percentage of SF of floor area served times the total number of students and teachers.

Energy Savings Calculations:

Estimated People in 2000 addition section : 490 People X 25% of Total floor area
123 People

$$Dom.HW\ Heat\ Consumption = \left(\frac{Gal}{Min}\right) \times 8.33 \left(\frac{lb}{Gal}\right) \times \Delta T(^{\circ}F) \times Time(Min) \times ...$$

$$(\#\ People) \times \left(\frac{Use}{Day/Person}\right) \times 210 \left(\frac{Days}{Yr}\right)$$

$$Dom.\ HW\ Gas\ Usage = \frac{Dom\ HW\ Heat\ Cons.(Btu)}{Heating\ Eff.(\%) \times Fuel\ Heat\ Value\left(\frac{BTU}{Therm}\right)}$$

$$Gas\ Energy\ Cost = Heating\ Gas\ Usage(Therms) \times Ave\ Fuel\ Cost\ \left(\frac{\$}{Therm}\right)$$

CONDENSING DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Nat Gas Hot Water Heater	Condensing Hot Water Heater	
Number of People	123	123	
Lavatory Sink Time (Minutes)	0.25	0.25	
Sink Uses per Day per Person	1	1	
Faucet Gallons Per Minute (GPM)	2.5	2.5	
Domestic Water Temperature Change (°F)	70	70	
Sink Usage (BTU)	9,413,421	9,413,421	
Heating Efficiency	81%	90%	
Nat Gas Cost ($/Therm)	1.48	1.48	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Consumption (Therms)	117	105	12
Energy Cost ($)	$172	$155	$18
COMMENTS:	*Savings are based on LEED-NC Version 2.2 Reference Guide for faucet and shower flow rates. Usage per person is estimated		

Installation cost for the two condensing hot water heaters is estimated to be $2,474.

From the NJ Smart Start® Program appendix, the hot water heater installation falls under the category “Gas Water Heating” and warrants an incentive as follows:

$$\text{Smart Start®}\ Incentive = (HWH\ Capacity \times\ \$\,2.00 / MBH) = (80 \times \$2.00 MBH) = \$160$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,474
NJ Smart Start Equipment Incentive ($):	$160
Net Installation Cost ($):	$2,314
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$18
Total Yearly Savings ($/Yr):	$18
Estimated ECM Lifetime (Yr):	12
Simple Payback	128.6
Simple Lifetime ROI	-90.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$216
Internal Rate of Return (IRR)	-25%
Net Present Value (NPV)	($2,134.83)

ECM #4: Window AC Unit Replacement

Description:

The primary source of cooling for the classrooms and offices throughout the facility are window air conditioners. These units vary in size, capacity and efficiency. The units have been replaced on an "as needed" basis throughout the school district. Some window AC units are old and inefficient. Approximately 30% of the window AC units are estimated to be 10 years old or older.

While some of the units are new, many of the units are significantly older and inefficient. It is recommended to utilize the energy star ratings as a minimum standard for replacing any window unit that is in need of replacement. Existing units that are old, however still working should be considered for replacement if the efficiency is below 8.0 to 8.5 EER. Window AC units that are over 10 years old are very likely to fall in this efficiency range.

This ECM shows the savings and payback for inefficient window air conditioners with new, Energy Star rated units. Qualifying product list can be found at Energy Star website at: www.energystar.gov/products. Although energy star rated products provide a valuable benchmark, it is recommended to consider even higher EER ratings for potential AC unit replacements where available.

Energy Savings Calculations:

Average Summer Electric Cost: $0.203/kWh (June through September)
Typical AC Unit Size: 18,000 BTU/HR

Estimated Full Load Hours of Unit: 800/Year

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}}\right) \times Full\ Load\ Hrs.$$

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

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

The typical unit size at this facility is 18,000 BTU/HR. The estimated installation cost is estimated to be $625 per window AC unit ($475 Materials). This is based on installation of the

window AC units by Cherry Hill staff at a cost of $100 per unit for small AC units (12,000 BTU/HR and below), and $150 per units for larger AC units (18,000 BTU/HR and above).

WINDOW AC UNIT CALCULATIONS								
Capacity BTU/H	**Full Load Hours**	**Typical Efficiency (10 Yrs & Older) EER**	**New Efficiency EER**	**Energy Savings, kWh**	**Demand Savings, kW**	**Cooling Cost Savings**	**Net Installed Cost**	**Simple Payback**
6,000	800	8.5	10.7	116	0.15	$24	$300	12.8
8,000	800	8.5	10.8	160	0.20	$32	$350	10.8
12,000	800	8.5	10.8	241	0.30	$49	$400	8.2
18,000	**800**	**8.5**	**10.7**	**348**	**0.44**	**$71**	**$625**	**8.9**
24,000	800	8	9.4	357	0.45	$72	$725	10.0

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$625
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$625
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$71
Total Yearly Savings ($/Yr):	$71
Estimated ECM Lifetime (Yr):	10
Simple Payback	8.8
Simple Lifetime ROI	13.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$710
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($19.36)

ECM #5: AC Units Replacement

Description:

Portions of the facility are cooled by direct expansion outdoor air cooled condensing systems. Both packaged and split systems were discovered and analyzed. Some of the existing units have surpassed their useful life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a condensing unit is twenty (20) years and fifteen (15) years for a packaged rooftop unit. Other systems are within the useful life but are not as efficient as the latest technology available. Usually, energy savings derived from replacing condensing units does not justify a reasonable payback term. Nevertheless, as the equipment ages, it loses efficiency due to clogged condensers, internal parts wear and deposits of oil and other contaminants on the heat exchangers. Replacing an older condensing unit avoids these issues along with some energy savings.

This energy conservation measure includes replacement of the packaged and split system condensing units on the roof with new equipment at equal capacities with R-410a refrigerant and replacement of the DX coil in the matched air handlers as required accommodating higher pressure refrigerant. The cost of this ECM also includes running new refrigerant lines.

It must be noted that manufacturing of the refrigerant gas R-22 is being phased out gradually. After 2010, HVAC manufacturers will continue to produce condensers and heat pumps using R-22 only from pre-existing R-22 supplies. The availability of R-22 gas will decline and R-22 equipment will be more expensive to maintain. On the other hand, converting most R-22 refrigeration systems into an alternative R-410a system requires replacement of the condensing unit, evaporator coils in the air handling unit, refrigerant pipes and fittings.

The unit's cooling efficiencies and capacities are as shown below. The owner should have a professional engineer verify heating and cooling loads prior to moving forward with this ECM.

AC UNITS			
Tag	**Cooling Capacity (Tons)**	**Existing EER/SEER**	**Proposed EER/SEER**
AC-1	3.5	10	15
DS-1	1.25	12.5	21
AC-2, 3, 4	4	12.6	13.8
AC, 5, 6, 7	5	12.6	13.8
RTU-1	5	6	15

Energy Savings Calculations:

Full Load Cooling Hrs. = 800 hrs/yr.
Average Cost of Electricity = $0.203/kWh (June through September)

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000 \left(\frac{Btu}{Ton\ hr}\right)}{1000 \left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}}\right) \times Full\ Load\ Hrs.$$

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

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

The calculations were carried out for the units and the results are tabulated in the below table.

AC UNIT CALCULATIONS								
Tag	**Total Cooling Capacity (Tons)**	**Energy Savings kWh**	**Demand Savings kW**	**Cooling Cost Savings**	**Total Installed Cost**	**Incentive**	**Net Cost**	**Simple Payback**
AC-1	3.5	1120	1.4	$227	$6,660	$322	$6,338	28
DS-1	1.25	389	0.5	$79	$6,660	$115	$6,545	83
AC-2, 3, 4	12	795	3.0	$484	$19,980	$1,104	$18,876	39
AC, 5, 6, 7	15	994	3.7	$605	$19,980	$1,380	$18,600	31
RTU-1	5	4800	6.0	$974	$11,460	$460	$11,000	11
Total	**36.75**	**8097**	**14.6**	**$2,370**	**$64,740**	**$3,381**	**$61,359**	**26**

From the NJ Smart Start® Program appendix, the packaged unit replacement falls under the category “Electric Unitary HVAC” and warrants an incentive based on efficiency (EER). The program incentives are calculated as follows:

$$\text{Smart Start®}\ Incentive = (Cooling\ Tons \times\ \$/Ton\ Incentive)$$

AC unit Smart Start Incentives were calculated in the table above for each AC unit.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$64,740
NJ Smart Start Equipment Incentive ($):	$3,381
Net Installation Cost ($):	$61,359
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,370
Total Yearly Savings ($/Yr):	$2,370
Estimated ECM Lifetime (Yr):	15
Simple Payback	25.9
Simple Lifetime ROI	-42.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$35,550
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($33,066.09)

ECM #6: Low Flow Water Closet & Urinals

Description:

The facility utilizes a mixture of old and new plumbing fixtures. Some of the bathroom groups are more modern than other sections based on upgrades that have taken place. The typical water closet and urinal water consumption only meet the minimum federally required standard for water efficiency. New fixtures are available that use less water than today's requirements and can add up to significant water reduction over a long period.

This ECM includes the replacement of the existing water closets and urinals within the older bathroom groups within the facility. Even though in some cases the new addition only utilize the standard consumption fixtures, this ECM is limiting the replacements to the older fixtures throughout the facility since the newer bathroom groups are relatively new. The estimated usage of the plumbing fixtures is based on floor area of the building served by the older un-renovated bathroom groups throughout the facility.

The proposed retrofit includes installation of low flow flushometer style water closets that utilize 1.28 gallons per flush and ultra-low flushometer style urinals that utilize 1/8 gallons per flush. For the basis of this calculation the LEED rating system was used to estimate the occupancy usage for students within the school. This ECM does not include private bathrooms for teachers use and is based solely on the large public bathrooms used by the students. When water consumption information was not available, the GPF values were estimated for the existing fixtures.

Energy Savings Calculations:

$$Water\ Cons = Occupancy\left(\frac{Days}{Yr}\right) \times Use\left(\frac{Flush}{Person\ per\ Day}\right) \times Fixture\left(\frac{Gal}{Flush}\right)$$

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

WATER CONSERVATION CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Fixtures	Low Flow Fixtures	
Total Number of Students	449	449	
Estimated % Floor Area Served by Older Bathrooms	80%	80%	
Occupied Days Per Year	180	180	
WC Uses per Day per Person	0.6	0.6	
Urinal Uses per Day per Person	0.4	0.4	
Total Urinal Flushes Per Day	72	72	
Total WC Flushes Per Day	107.8	107.8	
Urinal Gallons Per Flush (GPF)	1.0	0.125	0.875
WC Gallons Per Flush (GPF)	1.6	1.28	0.32
Water Cost ($/1000)	$7.93	$7.93	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Water Consumption (Gal)	43,966	26,444	17,522
Water Cost ($)	$349	$210	$139
COMMENTS:	*Savings are based on LEED Reference Guide for Green Building Design and Construction - 2009 Edition for WC and Urinal water usage.		

The cost for installation of 30 water closets and 6 low flow urinals throughout the facility is estimated to be $52,647.

There are no Smart Start rebates for installation of low flow plumbing fixtures.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$52,647
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$52,647
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$139
Total Yearly Savings ($/Yr):	$139
Estimated ECM Lifetime (Yr):	30
Simple Payback	378.8
Simple Lifetime ROI	-92.1%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$4,170
Internal Rate of Return (IRR)	-12%
Net Present Value (NPV)	($49,922.54)

ECM #7: Lighting Upgrade

Description:

The majority of the lighting at this facility is T-8 bulbs with electronic ballasts. The light fixtures installed in the building is the result of a district wide lighting upgrade to replace existing T-12 fixtures with magnetic ballast approximately 10 years ago. It was discovered that not all fixtures included T-8 bulbs and electronic ballasts. Approximately 10% of the existing fixtures still utilized magnetic ballasts with T-12 bulbs. It was also discovered that in some locations, T-12 bulbs were utilized in conjunction with electronic ballasts. In many cases a mixture of ballasts and bulbs were found within a single room. It is unclear whether the lighting retrofit was incomplete in providing a uniform lighting installation, or whether the mixture of fixture components are a result of the replacement of bulbs and ballasts over the years.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 bulbs. T8 fixtures will provide adequate lighting and will save the owner on electrical costs due to the better performance of the lamp and ballasts. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

It is important to note that the retrofit does not include the cost to replace the existing T-12 fixtures currently powered by electronic ballasts. There is very minimal energy savings from the retrofit of a T-12 to T-8 fixture where the existing T-12 fixture is powered by an electronic ballast. For the purpose standardizing the district's bulb and ballast maintenance requirements, it is highly recommended to retrofit all light fixtures to T-8 bulbs and corresponding ballasts. This retrofit provides standardization throughout the district, not energy savings.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = $10 per fixture

$$\text{Smart Start®}\ Incentive = (\#\ of\ 1-4\ lamp\ \ fixtures \times\ \$10)$$

$$\text{Smart Start®}\ Incentive = (40\ \ fixtures \times\ \$10) = \$400$$

Replacement and Maintenance Savings are calculated as follows:

$$Savings = (reduction\ in\ lamps\ replaced\ \ per\ \ year) \times (repacment\ \$\ per\ lamp + Labor\ \$\ per\ lamp)$$
$$Savings = (7.85\ lamps\ \ per\ \ year) \times (\$2.00 + \$5.00) = \$55$$

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,290
NJ Smart Start Equipment Incentive ($):	$400
Net Installation Cost ($):	$3,890
Maintenance Savings ($/Yr):	$55
Energy Savings ($/Yr):	$1,427
Total Yearly Savings ($/Yr):	$1,482
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.6
Simple Lifetime ROI	471.5%
Simple Lifetime Maintenance Savings	$825
Simple Lifetime Savings	$22,230
Internal Rate of Return (IRR)	38%
Net Present Value (NPV)	$13,802.02

ECM #8: Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control 20% - 28% energy savings.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors. The estimated savings is less than the savings listed above due to the continuous occupied nature of a classroom setting. Savings vary depending on space type and conditions surveyed in the field. The majority of the savings is expected to be after school hours when rooms are left with lights on.

This ECM includes replacement of standard wall switches with sensors wall switches for all individual offices, classrooms, large bathrooms, and libraries. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$Energy\ Savings = (\%\ Savings \times Occuapancy\ Sensored\ Light\ Energy\ (kWh/Yr))$$

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

Occupancy Sensor Wall Mounted (existing facility only) = $20 per sensor.
Occupancy Sensor Remote Mounted (existing facility only) = $35 per sensor

$$\text{Smart Start®}\ Incentive = (\#\ of\ \ wall\ mount \times\ \$\ 20) + (\#\ of\ ceiling\ mount \times 35)$$
$$= (4 \times \$20) + (33 \times \$35) = \$1235$$

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$8,065
NJ Smart Start Equipment Incentive ($):	$1,235
Net Installation Cost ($):	$6,830
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,370
Total Yearly Savings ($/Yr):	$1,370
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.0
Simple Lifetime ROI	200.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$20,550
Internal Rate of Return (IRR)	18%
Net Present Value (NPV)	$9,524.97

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy measures (REM) for the municipality utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 7,475 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 105.34 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 128,701 KWh annually, reducing the overall utility bill by approximately 53% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof space on the existing facility. Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory

PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

Direct purchase involves the BOE paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM		
PAYMENT TYPE	**SIMPLE PAYBACK**	**INTERNAL RATE OF RETURN**
Direct Purchase	12.59 Years	6.8%

*The solar energy measure is shown for reference in the executive summary Renewable Energy Measure (REM) table

The solar PV system analysis shows that based on the combination of solar renewable energy credits and the savings in electric costs as a result of the system's production, this measure will provide a 6.8% rate of return on the BOE's initial investment. It is recommended to implement the installation of a solar PV system if funding is available and otherwise would be invested at a

rate of return less than this measure. Another option to consider is a Power Purchase Agreement (PPA). A PPA is a source of funding available to entities that have the potential for a solar PV system installation, however lacks the funding to implement. It could be advantageous for the BOE to solicit Power Purchase Agreement (PPA) with a third party who will own, operate, and maintain the system for a contracted period (typically 15 years). During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the BOE at a reduced rate compared to their existing electric rate. This type of agreement allows the BOE to take advantage of renewable energy without the upfront costs of installation. The BOE should consider both options as a viable route for investing in renewable energy technologies.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed is not adequate, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

A load profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. For this report, the facility's energy consumption data was gathered from the school district and presented in table format and plotted in graph form to create the load profile. Refer to the Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity Overview:

The electricity usage profile demonstrates a typical cooling load profile for school facilities that have partial occupancy during the summer months. Historical usage is relatively steady throughout the year with an average monthly usage of 20,355 kWh and an average monthly demand of 87kw. Consumption months greater than the average were Feb, April, May, September and December.

The historical usage profile is beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to the relatively flat load profile and reduction in summer load. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the PSE&G's BGS-FP default rate are recommended.

Natural Gas Overview:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months of July and August has minimum consumption history. The average winter (Nov-Mar) consumption is 3,859 therms and the average summer (Apr-Oct) consumption is 534 therms. Consumption months greater than the average were January, February, October and December.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by the summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer a firm, fixed price for 100% of the facilities natural gas requirements are recommended.

Tariff Analysis:

Electricity:

This facility currently receives electric distribution service through PSE&G on rate schedule GLP (General Light and Power) and has contracted a Third Party Supplier (TPS) to provide electric commodity service as of May 2009. For electric supply (generation) service, the client has a choice to either use PSE&G's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The facility's current BGS-FP average price to compare for PSE&G's GLP rate is $0.1134/kWh. Based upon the current third party supplier electric rate of $0.1075/kWh contracted with South Jersey Energy, this facility will yield a projected savings of $1,420.00 annually over the BGS-FP default rate with PSE&G.

The utility, PSE&G will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. PSE&G's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge (kWh and Demand), Societal Benefits Charge (SBC), and Securitization Transition Charge.

Natural Gas:

This facility currently receives natural gas distribution service through PSE&G on rate schedule LVG (Large Volume General Service) and has contracted a Third Party Supplier (TPS) to provide firm natural gas commodity service.

PSE&G provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of natural gas BGSS charges from PSE&G for rate schedule LVG. http://www.pseg.com/companies/pseandg/schedules/pdf/commodity.pdf

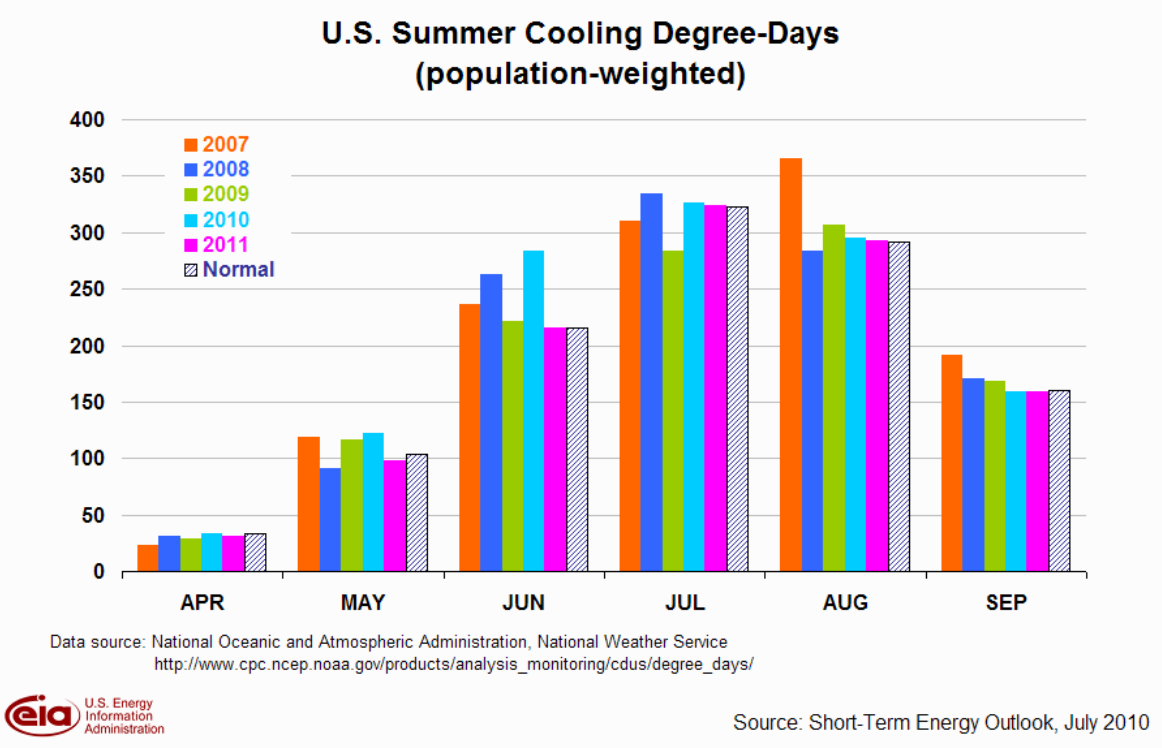
The 2009 BGSS average monthly price to compare for the facility was $0.718/therm. Based upon the current natural gas rate of $0.919/therm identified from the Hess Energy bills, this facility paid approximately $4,600.00 over the BGSS default rate with PSE&G for 2009. Please refer to the recommendations section for additional information.

The utility, PSE&G is responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. PSE&G's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, & Societal Benefits Charge (SBC).

Electric and Natural Gas Commodities Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2010, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technical's and trader sentiment. This market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.



Short Term Energy Outlook - US Energy Information Administration (7/7/2010):

> ***U.S. Natural Gas Prices.*** *The Henry Hub spot price averaged $4.80 per MMBtu in June, $0.66 per MMBtu higher than the average spot price in May (Henry Hub Natural Gas Price Chart). The forecast price for the second half of 2010 averages $4.68 per MM Btu, $0.32 per MMBtu higher than last month's Outlook. The risk of hurricane outages and the projected reduction in drilling activity combine to strengthen prices through the year. A small decline in U.S. production alongside increased consumption leads to higher prices in 2011; the projected Henry Hub spot price averages $5.17 per MMBtu.*
>
> *Uncertainty over future natural gas prices is lower this year compared with last year at this time. Natural gas futures for September 2010 delivery for the 5-day period ending July 1 averaged $4.77 per MMBtu, and the average implied volatility over the same period was 53 percent. This produced lower and upper bounds for the 95-percent confidence interval of $3.16 and $7.18 per MMBtu, respectively. At this time last year the natural gas September 2009 futures contract averaged $4.00 per MMBtu and implied volatility averaged almost 76 percent. This rendered the lower and upper limits of the 95-percent confidence interval at $2.25 and $7.14 per MMBtu.*
>
> ***U.S. Electricity Retail Prices****. EIA estimates that residential retail electricity prices during the first half of 2010 were about the same as in the first half of 2009. However, rising fuel costs for natural gas and coal generation are likely to push up retail prices later this year, causing prices over the entire year to grow by about 0.8 percent. Increased fuel costs should push residential prices higher by about 2.7 percent during 2011.*

Recommendations:

CEG recommends continuing an aggregated approach for 3rd party commodity supply procurement strategies. The primary area for immediate improvement is seen in the natural gas 3rd party supplier pricing. Natural gas pricing billed by Hess Energy for 2009 usage is approximately $2.00/mmbtu or $0.20/therm higher than current market based pricing. New natural gas supply contracts commencing in the near future for 2010-2012 supply requirements, would yield lower pricing as well as provide cost savings verses 2009 Hess Energy billed rates.
CEG does not have detailed information or a copy of the current natural gas supply agreement. Further analysis and review of more recent utility data and the existing 3rd party natural gas supply contract is required for further recommendations. Missing data includes: Start & End date of contract, Contracted price and Product Structure contracted.

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the school district utilize the advisement of 3rd party Energy Consulting Firm experienced in the procurement of retail natural gas and electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

- Budgets that reflect sound market intelligence
- An understanding of historical prices and trends
- Awareness of seasonal opportunities (e.g. shoulder months)
- Negotiation of fair contractual terms
- An aggressive, market based price

X. INSTALLATION FUNDING OPTIONS

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

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

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

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

iv. *Pay For Performance* – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings that were audited as part of the NJ Clean Energy's Local Government Energy Audit Program. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)

2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.

3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and $0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.

v. *Direct Install Program* – The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 60% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.

vi. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to $20,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local

government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - http://njcleanenergy.com/commercial-industrial/programs/eecbg-eligible-entities. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

This incentive is provided in addition to the other NJ Clean Energy program funding. This program's incentive is considered the entity's capital and therefore can be applied to the LGEA program's requirements to implement the recommended energy conservation measures totaling at least 25% of the energy audit cost. Additional requirements of this program are as follows:

1. The entity must utilize additional funding through one or more of the NJ Clean Energy programs such as Smart Start, Direct Install, and Pay for Performance.

2. The EECBG funding in combination with other NJ Clean Energy programs may not exceed the total cost of the energy conservation measures being implemented.

3. Envelope measures are applicable only if recommended by the LGEA energy audit and if the energy audit was completed within the past 12 months.

4. New construction and previously installed measures are not eligible for the EECBG rebate.

5. Energy conservation measures eligible for the EECBG must fall within the list of approved energy conservation measures. The complete list of eligible measures and other program requirements are included in the "EECBG Complete Application Package." The application package is available on the NJ Clean Energy website - http://njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants.

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

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output and limit the use of task lighting.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to “screen saver” mode which saves the screen life, not energy.

F. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

G. Turn off computer monitors and set computers to sleep when not being used. Computer monitors and computers are becoming one of the largest energy consumers in buildings today. Set computers to sleep when not being used and automatically turn off the computer monitors. Do not set computer monitors to “screen saver” mode which saves the screen life, not energy.

H. Minimize operation of air conditioning for unoccupied spaces. The 2000 building addition appeared to be cooling while classrooms were unoccupied.

I. Repair units that are not operating correctly. The Trane rooftop AC unit serving the teacher’s lounge was cycling off on high head pressure due to the condenser fan being frozen. This cycling can account for significant energy waste and damage to the air conditioning unit.

XII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

A. Cost Estimates noted within this report are based on industry accepted costing data such as RS Means™ Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
    a. operating hours
    b. equipment type
    c. control strategies
    d. scheduling
D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Cherry Hill Johnshon School

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Computer Monitor Replacement	$3,000	$0	$0	$3,000	$857	$0	$857	5	$4,285	$0	42.8%	3.5	13.19%	$924.81
ECM #2	Condensing Boiler Installation	$91,285	$102,881	$6,000	$188,166	$4,966	$0	$4,966	35	$173,810	$0	-7.6%	37.9	-0.43%	($81,460.47)
ECM #3	Condensing Hot Water Heater Installation	$2,352	$122	$160	$2,314	$18	$0	$18	12	$216	$0	-90.7%	128.6	-25.40%	($2,134.83)
ECM #4	Window AC Unit Replacement	$475	$150	$0	$625	$71	$0	$71	10	$710	$0	13.6%	8.8	2.39%	($19.36)
ECM #5	AC Unit Replacement	$34,900	$29,840	$3,381	$61,359	$2,370	$0	$2,370	15	$35,550	$0	-42.1%	25.9	-6.16%	($33,066.09)
ECM #6	Low Flow WC & Urinals	$21,000	$31,647	$0	$52,647	$139	$0	$139	30	$4,170	$0	-92.1%	378.8	-12.01%	($49,922.54)
ECM #7	Lighting Upgrade	$2,145	$2,145	$400	$3,890	$1,427	$55	$1,482	15	$22,230	$825	471.5%	2.6	37.79%	$13,802.02
ECM #8	Lighting Controls	$4,033	$4,033	$1,235	$6,830	$1,370	$0	$1,370	15	$20,550	$0	200.9%	5.0	18.48%	$9,524.97
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar PV System	$842,720	$0	$0	$842,720	$21,879	$45,045	$66,924	25	$1,673,100	$1,126,125	98.5%	12.6	6.16%	$322,637.50

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

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

Gas Absorption Chillers	$185 - $400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	$450 per ton, EER ≥ 16 $600 per ton, EER ≥ 18 $750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters > 50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH
Gas Fired Tankless Water Heaters	$300 per unit

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$15 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled
Daylight Dimming - office	$50 per fixture controlled

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Cherry Hill Johnson School

Building ID: 2348649
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 06, 2010

Facility
Cherry Hill Johnson School
500 Kresson Road
Cherry Hill, NJ 08034

Facility Owner
Cherry Hill Public Schools
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Primary Contact for this Facility
James Devereaux
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Year Built: 1966
Gross Floor Area (ft²): 51,550

Energy Performance Rating[2] (1-100) 67

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	833,497
Natural Gas (kBtu)[4]	2,303,446
Total Energy (kBtu)	3,136,943

Energy Intensity[5]

Site (kBtu/ft²/yr)	61
Source (kBtu/ft²/yr)	101

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	249

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	72
National Average Source EUI	119
% Difference from National Average Source EUI	-15%
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.

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

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

Certifying Professional
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) 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	Cherry Hill Johnson 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	500 Kresson Road, Cherry Hill, NJ 08034	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Johnson School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	51,550 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	100	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1	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	No	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	50 %	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	10(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: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: Electric (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	22,368.00
11/01/2009	11/30/2009	20,252.00
10/01/2009	10/31/2009	19,307.00
09/01/2009	09/30/2009	21,017.00
08/01/2009	08/31/2009	19,396.00
07/01/2009	07/31/2009	16,697.00
06/01/2009	06/30/2009	18,857.00
05/01/2009	05/31/2009	22,907.00
04/01/2009	04/30/2009	23,403.00
03/01/2009	03/31/2009	20,161.00
02/01/2009	02/28/2009	21,512.00
01/01/2009	01/31/2009	18,407.00

Electric Consumption (kWh (thousand Watt-hours))	**244,284.00**
Electric Consumption (kBtu (thousand Btu))	**833,497.01**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**833,497.01**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas

Meter: Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	4,703.28
11/01/2009	11/30/2009	1,379.83
10/01/2009	10/31/2009	633.74
09/01/2009	09/30/2009	26.48
08/01/2009	08/31/2009	23.11
07/01/2009	07/31/2009	23.11
06/01/2009	06/30/2009	28.61
05/01/2009	05/31/2009	269.56
04/01/2009	04/30/2009	2,733.91
03/01/2009	03/31/2009	3,765.30

02/01/2009	02/28/2009	4,617.99
01/01/2009	01/31/2009	4,829.54
Gas Consumption (therms)		**23,034.46**
Gas Consumption (kBtu (thousand Btu))		**2,303,446.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,303,446.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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
Cherry Hill Johnson School
500 Kresson Road
Cherry Hill, NJ 08034

Facility Owner
Cherry Hill Public Schools
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

Primary Contact for this Facility
James Devereaux
45 Ranoldo Terrace P.O. Box 5015
Cherry Hill, NJ 08034

General Information

Cherry Hill Johnson School	
Gross Floor Area Excluding Parking: (ft^2)	51,550
Year Built	1966
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Johnson School	
Space Type	K-12 School
Gross Floor Area(ft^2)	51,550
Open Weekends?	No
Number of PCs	100
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	No
Percent Cooled	50
Percent Heated	100
Months[o]	10
High School?	No
School District[o]	Cherry Hill

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2009)	**Baseline** (Ending Date 12/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	67	67	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	61	61	56	N/A	72
Source ($kBtu/ft^2$)	101	101	93	N/A	119
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	249	249	230	N/A	295
$kgCO_2e/ft^2$/year	5	5	5	N/A	6

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 Average column presents energy performance data your building would have if your building had an average rating of 50.

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

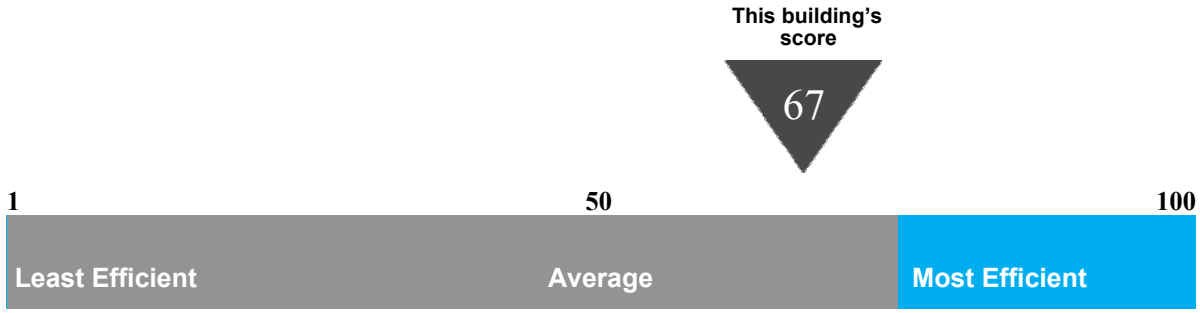
Statement of Energy Performance

2009

Cherry Hill Johnson School
500 Kresson Road
Cherry Hill, NJ 08034

Portfolio Manager Building ID: 2348649

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 101 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending December 2009

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: 08/06/2010

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Johnson School

Boilers

Tag	B -	B -	Boiler Sys Air
Unit Type	Cast Iron Sectional Boiler	Water Tube Boiler	Portable Air Compressor
Qty	1	2	1
Location	Original Boiler Room	2000 Addition Boiler Room	Original Boiler Room
Area Served	Original Building & 1996 Addition	2000 Addition Classrooms	Pneumatic Sys.
Manufacturer	HB Smith	A.O. Smith, Burkay Genesis	Magna Force
Model #	450 Mills, 18 sections	CB500 200	M109CL300-30A
Serial #	N/A	200 F00 57462 57439	K2150302
Input Capacity (MBH)	Burner 5700 CFH Max (Burner)	500	N/A
Rated Output Capacity (MBH)	3700 MBH	418.5	N/A
Approx. Efficiency %	75%	84%	N/A
Fuel	Natural Gas	Natural Gas	N/A
Year	1966	2000	2005 (Est)
Ashrae Service Life	35	24	N/A
Remaining Life	(9)	14	N/A
Comments	Fair condition. Insulation missing. Some rust. Relief valve- 3700 MBH, IBR Water Output - 2872 MBH	Like-new condition. Primary pumps. 42 GPM @ 11 ft., 1/4HP, Marathon Elec. Motors.	3 HP Air Compressor Motor

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Johnson School

Pumps

Tag	P -	P -	
Unit Type	Base-Mounted End Suction	Pipe Mount Inline	
Qty	2	2	
Location	Original Boiler Room	2000 Boiler Room	
Area Served	Original Building	2000	
Manufacturer	Bell & Gossett	Bell & Gossett	
Model #	185011	7QB5GB17D116	
Serial #	1665213		
Horse Power	5	1.00	
Flow	N/A	N/A	
Motor Info	Wagner - 215-71012-05ABA3W, Baldor - M3218T	N/A	
Electrical Power	208V, 3PH	208V, 1PH	
RPM	1740	1750	
Motor Efficiency %	Wagner Motor -83.3% (Est) Baldor Motor - 87.5% (Est)	82.5% (Est)	
Year	Wagner Pre-1990 (Est) Baldor - 2000 (Est)	2000	
Ashrae Service Life	20	10	
Remaining Life	0	0	
Comments	Fair condition.	Good condition.	

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Johnson School

Domestic Hot Water Heaters

Tag	HWH -	HWH -	
Unit Type	Tank Type HWH	Tank Type HWH	
Qty	1	1	
Location	Original Boiler Room	2000 Addition Boiler Room	
Area Served	Original Building	2000 Addition	
Manufacturer	A.O. Smith	A.O. Smith	
Model #	BTH 199 966	BT 65 104	
Serial #	MK01-1250471-966	MF00-0947024-104	
Size (Gallons)	100	48	
Input Capacity (MBH/KW)	199.9	60	
Recovery (Gal/Hr)	228	58.2	
Efficiency %	95%	80.80%	
Fuel	Natural Gas	Natural Gas	
Year	1-3 yrs (Est)	2000	
Ashrae Service Life	12	12	
Remaining Life	9-11 Yrs	2	
Comments	Relatively new and in excellent condition. Dom HW also connected to Boiler Heat Exchanger.	Relatively new and in good condition.	

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Johnson School

HVAC Units

Tag	UV -	WIN -	PTAC
Unit Type	Unit Ventilators	Window AC Units	Packaged Terminal Air Conditioner
Qty	One per Classroom	One per Classroom	2
Location	Original Building Classrooms	Original Building Classrooms	Principal Office, Guidance Office
Area Served	Classrooms	Classrooms	Principal Office, Guidance Office
Manufacturer	Nesbitt	Various	Remington Air Conditioner
Model #	N/A	N/A	CRK0C154-000AS
Serial #	N/A	N/A	0709-0087
Cooling Type	None	DX	DX package thru wall
Cooling Capacity (Tons)	N/A	1.0 - 2.0 Tons	N/A
Cooling Efficiency (SEER/EER)	N/A	7.0 - 10.7 EER	N/A
Heating Type	HW Coil	None	HW Coil
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Year	1966	Various	1966
Ashrae Service Life	20	10	10
Remaining Life	(24)	N/A	(34)
Comments	Poor to fair conditions.	Ranged in size and condition	Poor to fair conditions. One unit had all internals replaced. 208V, 1PH.

HVAC Units

Tag	AC-	AHU	DS-
Unit Type	Split System	Air Handling Unit	Ductless Split
Qty	1	2	1
Location	Library, courtyard	Multi-Purpose Room	Main Office
Area Served	Library	Multi-Purpose Room	Main Office
Manufacturer	Friedrich	N/A	Fujitsu
Model #	Outdoor - RCA043CBC	N/A	AOU15RLQ-Outdoor, ASU15RLQ-Indoor
Serial #	N/A	N/A	GVN001096-Outdoor
Cooling Type	DX Split	None	Ductless Split, DX, Heat Pump
Cooling Capacity (Tons)	3.5 Tons (Est)	N/A	15,000 BTU/HR
Cooling Efficiency (SEER/EER)	10 SEER (Est)	N/A	12.5 EER, 20 SEER
Heating Type	None	HW Coil	Heat Pump
Heating Input (MBH)	N/A	N/A	18,000 BTU, 6.3 A
Efficiency	N/A	N/A	10 HSPF
Fuel	N/A	N/A	Electricity
Year	Pre 1990 (Est)	1966 (Est)	2005 (Est)
Ashrae Service Life	15	20	15
Remaining Life	(5)	(24)	10
Comments	Fair condition but appears operational. R-22, 208V, 1PH.	Fair condition.	Inverter, 208V, 1PH.

HVAC Units

Tag	AC	AC	RTU
Unit Type	DX Split	DX Split	Roof Top Unit
Qty	3	3	1
Location	2000 Addition Mech Rooms	2000 Addition Mech Rooms	Roof
Area Served	2000 Addition	2000 Addition Classrooms	Teacher's Lounge
Manufacturer	AAON	AAON	Trane
Model #	Outdoor-CA0237, CA-05-2:BOACOAO	Outdoor-CA0238, CA-04-2:BOACOAO	SAHB-506-A
Serial #	Outdoor-200005-CCCE00224, 218, 195	Outdoor-200005-CCCD00186	C84H-02444
Cooling Type	DX Split	DX Split	DX-Packaged
Cooling Capacity (Tons)	N/A	N/A	5 Tons (Est)
Cooling Efficiency (SEER/EER)	N/A	N/A	6.0 EER (Est)
Heating Type	HW coils, 3-way control	HW coils, 3-way control	Electric
Heating Input (MBH)	N/A	N/A	10, 17, 30, 35 kW
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	Electricity
Year	2000	2000	Pre 1990 (Est)
Ashrae Service Life	15	15	15
Remaining Life	5	5	(5)
Comments	R-22.	R-22	Extremely Poor Condition. Shutting off high head pressure. Not Working.

HVAC Units

Tag	UV		
Unit Type	Unit Ventilator		
Qty	2		
Location	1996 Classrooms		
Area Served	1996 Classrooms		
Manufacturer	Snyder General		
Model #	BDBEVLEAA271725000		
Serial #	72H0294900 4600		
Cooling Type	Package DX Unit Ventilator		
Cooling Capacity (Tons)	5 Tons (Est)		
Cooling Efficiency (SEER/EER)	8.5 EER (Est)		
Heating Type	HW Coils		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Year	1996		
Ashrae Service Life	15		
Remaining Life	1		
Comments	Good condition.		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Cherry Hill - Johnson School

Plumbing Fixtures

Tag	LAV	Urinal	WC
Unit Type	Lavatory	Urinal	Water Closet
Qty	N/A	N/A	N/A
Location	2000 Addtiion Bathrooms	2000 Addtiion Bathrooms	2000 Addtiion Bathrooms
Area Served	2000 Addtiion Bathrooms	2000 Addtiion Bathrooms	2000 Addtiion Bathrooms
Manufacturer	Bradley	Kohler	Kohler
Model #	N/A	N/A	N/A
Serial #	N/A	N/A	N/A
Water Use (GPM / GPF)	0.5 GPM (Est)	1.0 GPF	1.6 GPF
Water Valve	Sensored On/Off	Sloan Sensored Flush Valves	Sloan Sensored Flush Valves
Year	2000	2000	2000
Ashrae Service Life	N/A	N/A	N/A
Remaining Life	N/A	N/A	N/A
Comments	Good condition.	Good condition.	Good condition.

Plumbing Fixtures

Tag	LAV	Urinal	WC
Unit Type	Lavatory	Urinal	Water Closet
Qty	N/A	N/A	N/A
Location	Original Bathrooms & 1996 Addition	Original Bathrooms & 1996 Addition	Original Bathrooms & 1996 Addition
Area Served	Original Bathrooms & 1996 Addition	Original Bathrooms & 1996 Addition	Original Bathrooms & 1996 Addition
Manufacturer	American Standard	American Standard	American Standard
Model #	N/A	N/A	N/A
Serial #	N/A	N/A	N/A
Water Use (GPM / GPF)	N/A	1.0 GPF	1.6 GPF
Water Valve	Sensored On/Off	Sloan Sensored Flush Valves	Sloan Sensored Flush Valves
Year	N/A	N/A	N/A
Ashrae Service Life	N/A	N/A	N/A
Remaining Life	N/A	N/A	N/A
Comments	Some Lavs utilzed manual valves, good condition	good condition	good condition

Investment Grade Lighting Audit

CEG Job #: 9C09182
Project: Johnson School
500 Kresson Road
Cherry Hill, NJ
Sq. Ft. 51,550

Johnson

KWH COST: $0.170

ECM #7: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
211.11	Classroom 24	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2,106.0	$358.02	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22	Restroom	1300	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	44.2	$7.51	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 22	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2,106.0	$358.02	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	22-24 Storage	800	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	24.0	$4.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 23	2600	23	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.69	1,794.0	$304.98	23	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 21	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1,950.0	$331.50	25	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 21-24	3600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1,548.0	$263.16	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25		3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$157.90	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
603		3600	2	2	Incandescent Exit Sign	20	0.04	144.0	$24.48	2	1	LED Exit Sign	5	0.01	36	$6.12	$65.00	$130.00	0.03	108	$18.36	7.08
211.11	Stage	3600	6	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.18	648.0	$110.16	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
31	All Purpose Room	2600	12	6	4x4 6 Light, Elect. Ballast, White Diffuser	180	2.16	5,616.0	$954.72	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	2	1	15" Round Ceiling Mnt., 32w Circuline	34	0.07	176.8	$30.06	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	APR Storage	800	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	48.0	$8.16	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Kitchen	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234.0	$39.78	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Boy's Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78.0	$13.26	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Girl's Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78.0	$13.26	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

237.21	Lobby	3600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	1,238.4	$210.53	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
30	Vestibule	3600	2	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.20	720.0	$122.40	2	1	(2) 26w CFL Lamp	26	0.05	187.2	$31.82	$20.00	$40.00	0.15	532.8	$90.58	0.44
211.11	Nurse	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312.0	$53.04	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
611	Restroom	1300	1	1	Wall Mnt. , (1) 60w A19 Lamps	60	0.06	78.0	$13.26	1	1	13w CFL Lamp	13	0.01	16.9	$2.87	$20.00	$20.00	0.05	61.1	$10.39	1.93
211.11	Main Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312.0	$53.04	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
30	Main Office	2600	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	260.0	$44.20	1	1	(2) 26w CFL Lamp	26	0.03	67.6	$11.49	$20.00	$20.00	0.07	192.4	$32.71	0.61
211.11	Principal's Office	2600	6	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.18	468.0	$79.56	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Copy Room	2600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	156.0	$26.52	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Conference Room	2600	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	546.0	$92.82	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 6	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 5	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 4	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2,106.0	$358.02	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 2	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2,106.0	$358.02	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	2-4 Storage	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78.0	$13.26	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 1	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2,106.0	$358.02	27	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 3	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1,950.0	$331.50	25	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
111.11		2600	2	1	4' Channel, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.10	249.6	$42.43	2	1	1 Lamp, 32w T8, Elect. Ballast; retrofit	30	0.06	156	$26.52	$80.00	$160.00	0.04	93.6	$15.91	10.06
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	1-3 Storage	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78.0	$13.26	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 1-4	3600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1,548.0	$263.16	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

237.25	Corridor 1-4	3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$157.90	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.11	Storage B	800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect	58	0.12	92.8	$15.78	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor - Main Office	3600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	4,334.4	$736.85	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 7	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 8	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 10	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 9	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 11	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 12	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Boy's Restroom	2600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	$76.91	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Girl's Restroom	2600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	$76.91	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
132.21	Classroom 26	2600	15	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	1.91	4,953.0	$842.01	15	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.87	2262	$384.54	$100.00	$1,500.00	1.04	2691	$457.47	3.28
132.21	Classroom 25	2600	16	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	2.03	5,283.2	$898.14	16	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.93	2412.8	$410.18	$100.00	$1,600.00	1.10	2870.4	$487.97	3.28
122.21	Corridor 25-26	3600	5	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1,404.0	$238.68	5	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.29	1044	$177.48	$100.00	$500.00	0.10	360	$61.20	8.17
237.21	Corridor 7-12	3600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.86	3,096.0	$526.32	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	Girl's Restroom	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234.0	$39.78	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	Boy's Restroom	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234.0	$39.78	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Custodian Closet	800	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	48.0	$8.16	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 13	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 14	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Conf. Room B	2600	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	546.0	$92.82	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

211.11	Storage C	800	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	24.0	$4.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 15	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 16	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Media Center	2600	35	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	1.05	2,730.0	$464.10	35	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
111.11		2600	2	1	4' Channel, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.10	249.6	$42.43	2	1	1 Lamp, 32w T8, Elect. Ballast; retrofit	30	0.06	156	$26.52	$80.00	$160.00	0.04	93.6	$15.91	10.06
211.11	Media Center Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312.0	$53.04	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Faculty Room	2600	14	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.42	1,092.0	$185.64	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
30		2600	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	260.0	$44.20	1	1	(2) 26w CFL Lamp	26	0.03	67.6	$11.49	$20.00	$20.00	0.07	192.4	$32.71	0.61
611	Restroom	1300	2	1	Wall Mnt. , (1) 60w A19 Lamps	60	0.12	156.0	$26.52	2	1	13w CFL Lamp	13	0.03	33.8	$5.75	$20.00	$40.00	0.09	122.2	$20.77	1.93
211.11	Classroom 17	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 13-17	3600	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.95	3,405.6	$578.95	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.45	Mech Room C	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Clear Acrylic Lens	58	0.06	46.4	$7.89	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Boy's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$76.02	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Girl's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$76.02	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 27	2600	19	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.63	4,248.4	$722.23	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 29	2600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	3,130.4	$532.17	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.45	Mech Room A	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Clear Acrylic Lens	58	0.06	46.4	$7.89	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 31	2600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	3,130.4	$532.17	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Classroom 30	2600	15	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.29	3,354.0	$570.18	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.34	Mech Room B	800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	92.8	$15.78	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 28	2600	15	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.29	3,354.0	$570.18	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Corridor 27-31	3600	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.95	3,405.6	$578.95	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

30	Storage E	800	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	80.0	$13.60	1	1	(2) 26w CFL Lamp	26	0.03	20.8	$3.54	$20.00	$20.00	0.07	59.2	$10.06	1.99
211.11	Classroom 18	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 19	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 20	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1,404.0	$238.68	18	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Custodian Office	3600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	216.0	$36.72	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 18-20	3600	7	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.60	2,167.2	$368.42	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Boiler Room	4200	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	882.0	$149.94	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Electric Room	4200	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	252.0	$42.84	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
550	Exterior	4200	2	1	Recessed Down Light, 60w A19 Lamp	60	0.12	504.0	$85.68	2	1	13w CFL Lamp	13	0.03	109.2	$18.56	$20.00	$40.00	0.09	394.8	$67.12	0.60
725		4200	2	1	150w HPS Wallpack	188	0.38	1,579.2	$268.46	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
30		4200	2	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.20	840.0	$142.80	2	1	(2) 26w CFL Lamp	26	0.05	218.4	$37.13	$20.00	$40.00	0.15	621.6	$105.67	0.38
765		4200	2	1	400w HPS Flood	465	0.93	3,906.0	$664.02	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		862	149			41.79	117,424	$19,962	862	17			2.47	6,788	$1,154.01		$4,290.00	3.09	8393.1	$1,426.83	3.01

CEG Job #: 9C09182
Project: Johnson School
Address: 500 Kresson Road
Cherry Hill, NJ
Building SF: 97,903

Johnson

KWH COST: $0.170

ECM #8: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS											SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
211.11	Classroom 24	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2106	$358.02	27	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.16	10%	1895.4	$322.22	$225.00	$225.00	0.65	210.6	$35.80	6.28
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
22	Restroom	1300	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	44.2	$7.51	1	0	No Change	34	0.01	0%	44.2	$7.51	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 22	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2106	$358.02	27	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.16	10%	1895.4	$322.22	$225.00	$225.00	0.65	210.6	$35.80	6.28
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	22-24 Storage	800	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	24	$4.08	1	0	No Change	30	0.01	0%	24	$4.08	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 23	2600	23	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.69	1794	$304.98	23	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.14	10%	1614.6	$274.48	$225.00	$225.00	0.55	179.4	$30.50	7.38
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 21	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1950	$331.50	25	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.15	10%	1755	$298.35	$225.00	$225.00	0.60	195	$33.15	6.79
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 21-24	3600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1548	$263.16	5	0	No Change	86	0.09	0%	1548	$263.16	$0.00	$0.00	0.00	0	$0.00	0.00
237.25		3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$157.90	3	1	Daylight Sensor (Sensorswitch PP-20 & CM-PC or equal)	86	0.05	20%	743.04	$126.32	$160.00	$160.00	0.21	185.76	$31.58	5.07
603		3600	2	2	Incandescent Exit Sign	20	0.04	144	$24.48	2	0	No Change	20	0.01	0%	144	$24.48	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Stage	3600	6	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.18	648	$110.16	6	0	No Change	30	0.04	0%	648	$110.16	$0.00	$0.00	0.00	0	$0.00	0.00
31	All Purpose Room	2600	12	6	4x4 6 Light, Elect. Ballast, White Diffuser	180	2.16	5616	$954.72	12	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	180	0.43	10%	5054.4	$859.25	$225.00	$225.00	1.73	561.6	$95.47	2.36
22		2600	2	1	15" Round Ceiling Mnt., 32w Circuline	34	0.07	176.8	$30.06	2	0	No Change	34	0.01	0%	176.8	$30.06	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	APR Storage	800	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	48	$8.16	2	0	No Change	30	0.01	0%	48	$8.16	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Kitchen	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234	$39.78	3	0	No Change	30	0.02	0%	234	$39.78	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Boy's Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78	$13.26	1	0	No Change	30	0.01	0%	78	$13.26	$0.00	$0.00	0.00	0	$0.00	0.00

211.11	Girl's Restroom	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78	$13.26	1	0	No Change	30	0.01	0%	78	$13.26	$0.00	$0.00	0.00	0	$0.00	0.00
237.21	Lobby	3600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	1238.4	$210.53	4	0	No Change	86	0.07	0%	1238.4	$210.53	$0.00	$0.00	0.00	0	$0.00	0.00
30	Vestibule	3600	2	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.20	720	$122.40	2	0	No Change	100	0.04	0%	720	$122.40	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Nurse	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312	$53.04	4	0	No Change	30	0.02	0%	312	$53.04	$0.00	$0.00	0.00	0	$0.00	0.00
611	Restroom	1300	1	1	Wall Mnt. , (1) 60w A19 Lamps	60	0.06	78	$13.26	1	0	No Change	60	0.01	0%	78	$13.26	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Main Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312	$53.04	4	0	No Change	30	0.02	0%	312	$53.04	$0.00	$0.00	0.00	0	$0.00	0.00
30	Main Office	2600	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	260	$44.20	1	0	No Change	100	0.02	0%	260	$44.20	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Principal's Office	2600	6	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.18	468	$79.56	6	0	No Change	30	0.04	0%	468	$79.56	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Copy Room	2600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	156	$26.52	2	0	No Change	30	0.01	0%	156	$26.52	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Conference Room	2600	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	546	$92.82	7	0	No Change	30	0.04	0%	546	$92.82	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 6	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 5	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 4	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2106	$358.02	27	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.16	10%	1895.4	$322.22	$225.00	$225.00	0.65	210.6	$35.80	6.28
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 2	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2106	$358.02	27	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.16	10%	1895.4	$322.22	$225.00	$225.00	0.65	210.6	$35.80	6.28
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	2-4 Storage	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78	$13.26	1	0	No Change	30	0.01	0%	78	$13.26	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 1	2600	27	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.81	2106	$358.02	27	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.16	10%	1895.4	$322.22	$225.00	$225.00	0.65	210.6	$35.80	6.28
22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 3	2600	25	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.75	1950	$331.50	25	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.15	10%	1755	$298.35	$225.00	$225.00	0.60	195	$33.15	6.79
111.11		2600	2	1	4' Channel, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.10	249.6	$42.43	2	0	No Change	48	0.02	10%	224.64	$38.19	$0.00	$0.00	0.00	24.96	$4.24	0.00

22		2600	1	1	15" Round Ceiling Mnt., 32w Circuline	34	0.03	88.4	$15.03	1	0	No Change	34	0.01	0%	88.4	$15.03	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	1-3 Storage	2600	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	78	$13.26	1	0	No Change	30	0.01	0%	78	$13.26	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 1-4	3600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1548	$263.16	5	0	No Change	86	0.09	0%	1548	$263.16	$0.00	$0.00	0.00	0	$0.00	0.00
237.25		3600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	928.8	$157.90	3	1	Daylight Sensor (Sensorswitch PP-20 & CM-PC or equal)	86	0.05	20%	743.04	$126.32	$160.00	$160.00	0.21	185.76	$31.58	5.07
222.11	Storage B	800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect	58	0.12	92.8	$15.78	2	0	No Change	58	0.02	0%	92.8	$15.78	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor - Main Office	3600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	4334.4	$736.85	14	0	No Change	86	0.24	0%	4334.4	$736.85	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 7	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 8	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 10	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 9	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 11	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 12	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
227.21	Boy's Restroom	2600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	$76.91	3	0	No Change	58	0.03	0%	452.4	$76.91	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Girl's Restroom	2600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	0.17	452.4	$76.91	3	0	No Change	58	0.03	0%	452.4	$76.91	$0.00	$0.00	0.00	0	$0.00	0.00
132.21	Classroom 26	2600	15	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	1.91	4953	$842.01	15	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	127	0.38	10%	4457.7	$757.81	$225.00	$225.00	1.52	495.3	$84.20	2.67
132.21	Classroom 25	2600	16	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	2.03	5283.2	$898.14	16	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	127	0.41	10%	4754.88	$808.33	$225.00	$225.00	1.63	528.32	$89.81	2.51
122.21	Corridor 25-26	3600	5	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1404	$238.68	5	0	No Change	78	0.08	0%	1404	$238.68	$0.00	$0.00	0.00	0	$0.00	0.00

237.21	Corridor 7-12	3600	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.86	3096	$526.32	10	0	No Change	86	0.17	0%	3096	$526.32	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	Girl's Restroom	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234	$39.78	3	0	No Change	30	0.02	0%	234	$39.78	$0.00	$0.00	0.00	0	$0.00	0.00
211.21	Boy's Restroom	2600	3	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.09	234	$39.78	3	0	No Change	30	0.02	0%	234	$39.78	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Custodian Closet	800	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	48	$8.16	2	0	No Change	30	0.01	0%	48	$8.16	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 13	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 14	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Conf. Room B	2600	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	546	$92.82	7	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	30	0.04	10%	491.4	$83.54	$160.00	$160.00	0.17	54.6	$9.28	17.24
211.11	Storage C	800	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.03	24	$4.08	1	0	No Change	30	0.01	0%	24	$4.08	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 15	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 16	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Media Center	2600	35	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	1.05	2730	$464.10	35	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.21	10%	2457	$417.69	$225.00	$225.00	0.84	273	$46.41	4.44
111.11		2600	2	1	4' Channel, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.10	249.6	$42.43	2	0	No Change	48	0.02	10%	224.64	$38.19	$0.00	$0.00	0.00	24.96	$4.24	0.00
211.11	Media Center Office	2600	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.12	312	$53.04	4	0	No Change	30	0.02	0%	312	$53.04	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Faculty Room	2600	14	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.42	1092	$185.64	14	1	Dual Technology Occupancy Sensor (Sensorswitch or equal)	30	0.08	10%	982.8	$167.08	$160.00	$160.00	0.34	109.2	$18.56	6.96
30		2600	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	260	$44.20	1	0	No Change	100	0.02	10%	234	$39.78	$0.00	$0.00	0.00	26	$4.42	0.00
611	Restroom	1300	2	1	Wall Mnt. , (1) 60w A19 Lamps	60	0.12	156	$26.52	2	0	No Change	60	0.02	0%	156	$26.52	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 17	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
237.25	Corridor 13-17	3600	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.95	3405.6	$578.95	11	0	No Change	86	0.19	0%	3405.6	$578.95	$0.00	$0.00	0.00	0	$0.00	0.00
221.45	Mech Room C	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Clear Acrylic Lens	58	0.06	46.4	$7.89	1	0	No Change	58	0.01	0%	46.4	$7.89	$0.00	$0.00	0.00	0	$0.00	0.00

232.21	Boy's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$76.02	2	0	No Change	86	0.03	0%	447.2	$76.02	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Girl's Restroom	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	447.2	$76.02	2	0	No Change	86	0.03	0%	447.2	$76.02	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 27	2600	19	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.63	4248.4	$722.23	19	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	86	0.33	10%	3823.56	$650.01	$225.00	$225.00	1.31	424.84	$72.22	3.12
232.21	Classroom 29	2600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	3130.4	$532.17	14	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	86	0.24	10%	2817.36	$478.95	$225.00	$225.00	0.96	313.04	$53.22	4.23
221.45	Mech Room A	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Clear Acrylic Lens	58	0.06	46.4	$7.89	1	0	No Change	58	0.01	0%	46.4	$7.89	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 31	2600	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.20	3130.4	$532.17	14	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	86	0.24	10%	2817.36	$478.95	$225.00	$225.00	0.96	313.04	$53.22	4.23
232.22	Classroom 30	2600	15	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.29	3354	$570.18	15	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	86	0.26	10%	3018.6	$513.16	$225.00	$225.00	1.03	335.4	$57.02	3.95
221.34	Mech Room B	800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	92.8	$15.78	2	0	No Change	58	0.02	0%	92.8	$15.78	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 28	2600	15	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.29	3354	$570.18	15	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	86	0.26	10%	3018.6	$513.16	$225.00	$225.00	1.03	335.4	$57.02	3.95
232.21	Corridor 27-31	3600	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.95	3405.6	$578.95	11	0	No Change	86	0.19	0%	3405.6	$578.95	$0.00	$0.00	0.00	0	$0.00	0.00
30	Storage E	800	1	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.10	80	$13.60	1	0	No Change	100	0.02	0%	80	$13.60	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Classroom 18	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 19	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Classroom 20	2600	18	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.54	1404	$238.68	18	1	2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	30	0.11	10%	1263.6	$214.81	$225.00	$225.00	0.43	140.4	$23.87	9.43
211.11	Custodian Office	3600	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	216	$36.72	2	0	No Change	30	0.01	0%	216	$36.72	$0.00	$0.00	0.00	0	$0.00	0.00
237.25	Corridor 18-20	3600	7	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.60	2167.2	$368.42	7	0	No Change	86	0.12	0%	2167.2	$368.42	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Boiler Room	4200	7	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.21	882	$149.94	7	0	No Change	30	0.04	0%	882	$149.94	$0.00	$0.00	0.00	0	$0.00	0.00

211.11	Electric Room	4200	2	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	30	0.06	252	$42.84	2	0	No Change	30	0.01	0%	252	$42.84	$0.00	$0.00	0.00	0	$0.00	0.00
550	Exterior	4200	2	1	Recessed Down Light, 60w A19 Lamp	60	0.12	504	$85.68	2	0	No Change	60	0.02	0%	504	$85.68	$0.00	$0.00	0.00	0	$0.00	0.00
725		4200	2	1	150w HPS Wallpack	188	0.38	1579.2	$268.46	2	0	No Change	188	0.08	0%	1579.2	$268.46	$0.00	$0.00	0.00	0	$0.00	0.00
30		4200	2	1	1x1 Recessed Down Light, (1) 100w A19 Lamp	100	0.20	840	$142.80	2	0	No Change	100	0.04	0%	840	$142.80	$0.00	$0.00	0.00	0	$0.00	0.00
765		4200	2	1	400w HPS Flood	465	0.93	3906	$664.02	2	0	No Change	465	0.19	0%	3906	$664.02	$0.00	$0.00	0.00	0	$0.00	0.00
0	Totals		862	149			41.8	117,424.4	$19,962	862	37		0	8.4		109,364.4	$18,591.95		$8,065	23.84	8,060	$1,370	5.89

Project Name: LGEA Solar PV Project - J. Johnson Elementary School
Location: Cherry Hill, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

	Photovoltaic System - Direct Purchase
Total Construction Cost	$842,720
Annual kWh Production	128,701
Annual Energy Cost Reduction	$21,879
Annual SREC Revenue	$45,045
First Cost Premium	**$842,720**
Simple Payback:	**12.59** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.170**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$842,720	0	0	0	$0	(842,720)	0
1	$0	128,701	$21,879	$0	$45,045	$66,925	($775,795)
2	$0	128,057	$22,536	$0	$44,820	$67,356	($708,440)
3	$0	127,417	$23,212	$0	$44,596	$67,808	($640,632)
4	$0	126,780	$23,908	$0	$44,373	$68,281	($572,351)
5	$0	126,146	$24,625	$1,299	$44,151	$67,477	($504,874)
6	$0	125,515	$25,364	$1,293	$43,930	$68,002	($436,873)
7	$0	124,888	$26,125	$1,286	$43,711	$68,549	($368,323)
8	$0	124,263	$26,909	$1,280	$43,492	$69,121	($299,202)
9	$0	123,642	$27,716	$1,274	$43,275	$69,717	($229,485)
10	$0	123,024	$28,547	$1,267	$43,058	$70,339	($159,147)
11	$0	122,409	$29,404	$1,261	$42,843	$70,986	($88,161)
12	$0	121,797	$30,286	$1,255	$42,629	$71,660	($16,500)
13	$0	121,188	$31,194	$1,248	$42,416	$72,362	$55,862
14	$0	120,582	$32,130	$1,242	$42,204	$73,092	$128,954
15	$0	119,979	$33,094	$1,236	$41,993	$73,851	$202,805
16	$0	119,379	$34,087	$1,230	$41,783	$74,640	$277,445
17	$0	118,782	$35,110	$1,223	$41,574	$75,460	$352,905
18	$0	118,188	$36,163	$1,217	$41,366	$76,311	$429,216
19	$0	117,597	$37,248	$1,211	$41,159	$77,196	$506,412
20	$0	117,009	$38,365	$1,205	$40,953	$78,113	$584,525
21	$1	116,424	$39,516	$1,199	$40,748	$79,066	$663,591
22	$2	115,842	$40,702	$1,193	$40,545	$80,053	$743,644
23	$3	115,263	$41,923	$1,187	$40,342	$81,078	$824,722
24	$4	114,687	$43,180	$1,181	$40,140	$82,139	$906,861
25	$5	114,113	$44,476	$1,175	$39,940	$83,240	$990,101
	Totals:	3,031,675	$797,698	$25,963	$1,061,086	$1,832,821	$1,867,257
				Net Present Value (NPV)		**$990,126**	
				Internal Rate of Return (IRR)		**6.8%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
J. Johnson Elementary School	7,475	Sunpower SPR230	458	14.7	6,734	105.34	128,701	15,114	15.64

PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	105.3 kW
DC to AC Derate Factor:	0.810
AC Rating:	85.3 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.0 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.58	6843	1163.31
2	3.33	8081	1373.77
3	4.31	11285	1918.45
4	5.20	12855	2185.35
5	5.85	14682	2495.94
6	6.14	14290	2429.30
7	6.06	14436	2454.12
8	5.54	13267	2255.39
9	4.85	11407	1939.19
10	3.76	9314	1583.38
11	2.65	6526	1109.42
12	2.23	5715	971.55
Year	4.38	128701	21879.17

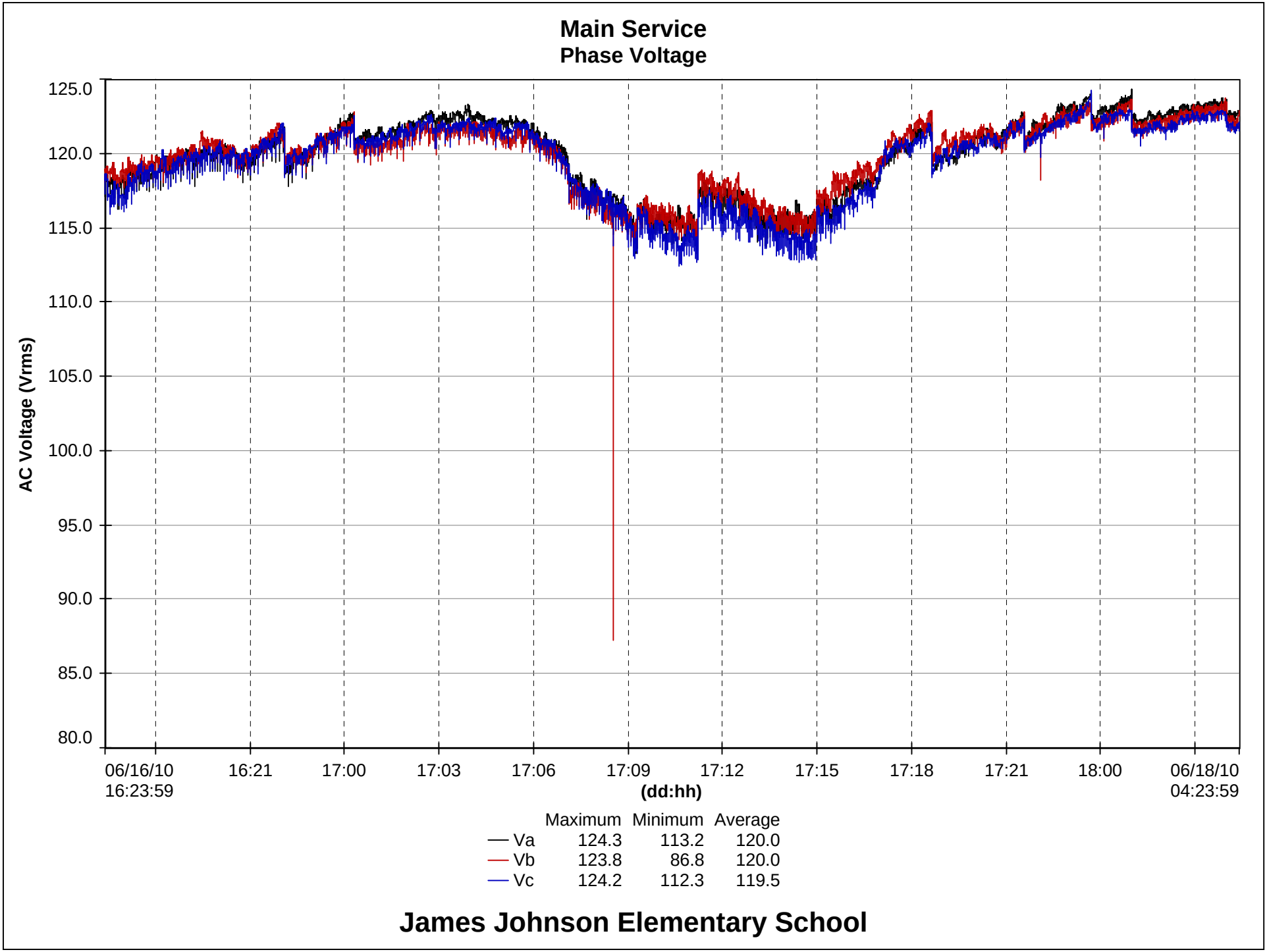
.= Proposed PV Layout

Note: Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

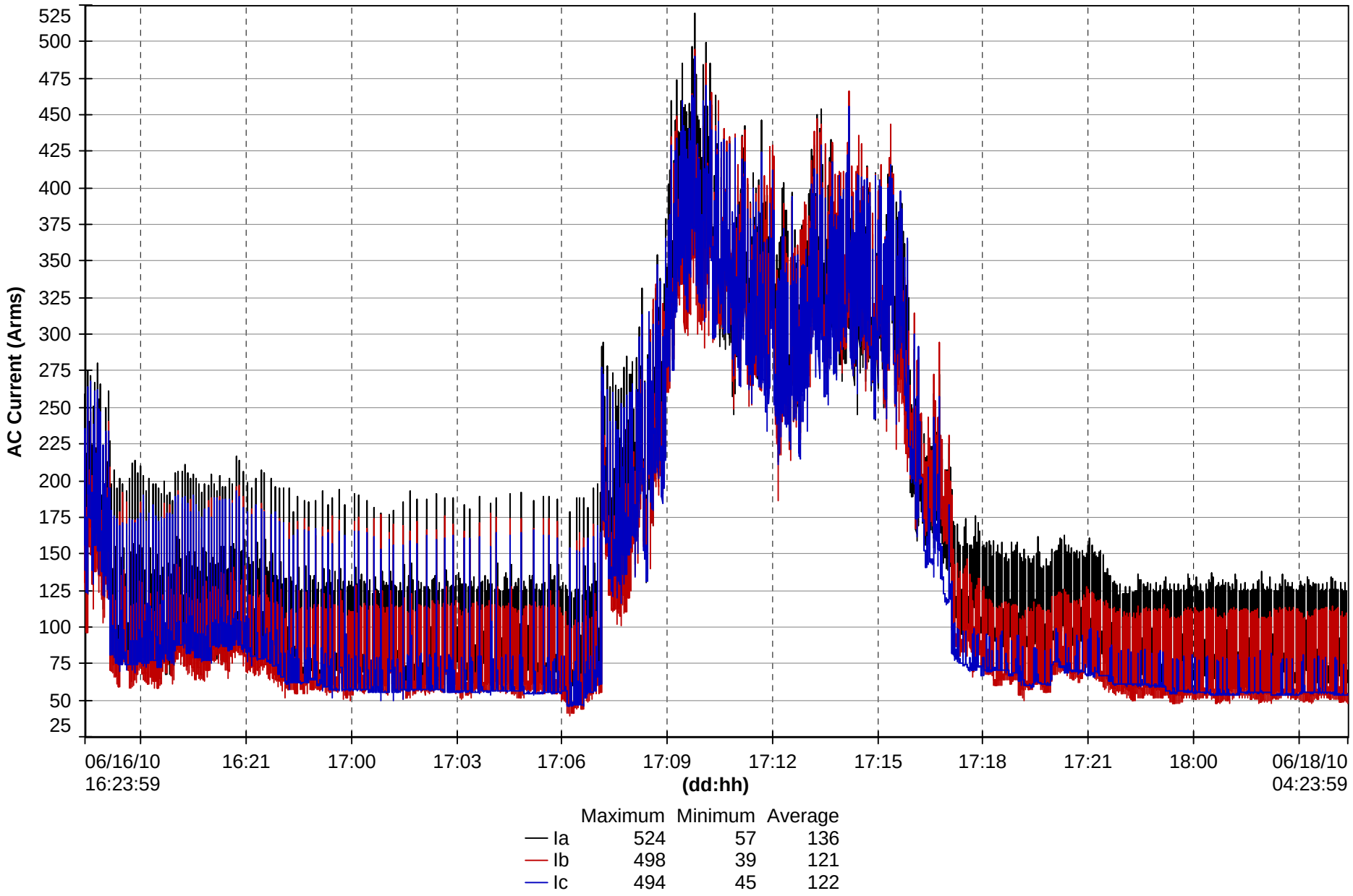
James Johnson Elementary School

Electrical Load Study
June 16 – 18, 2010

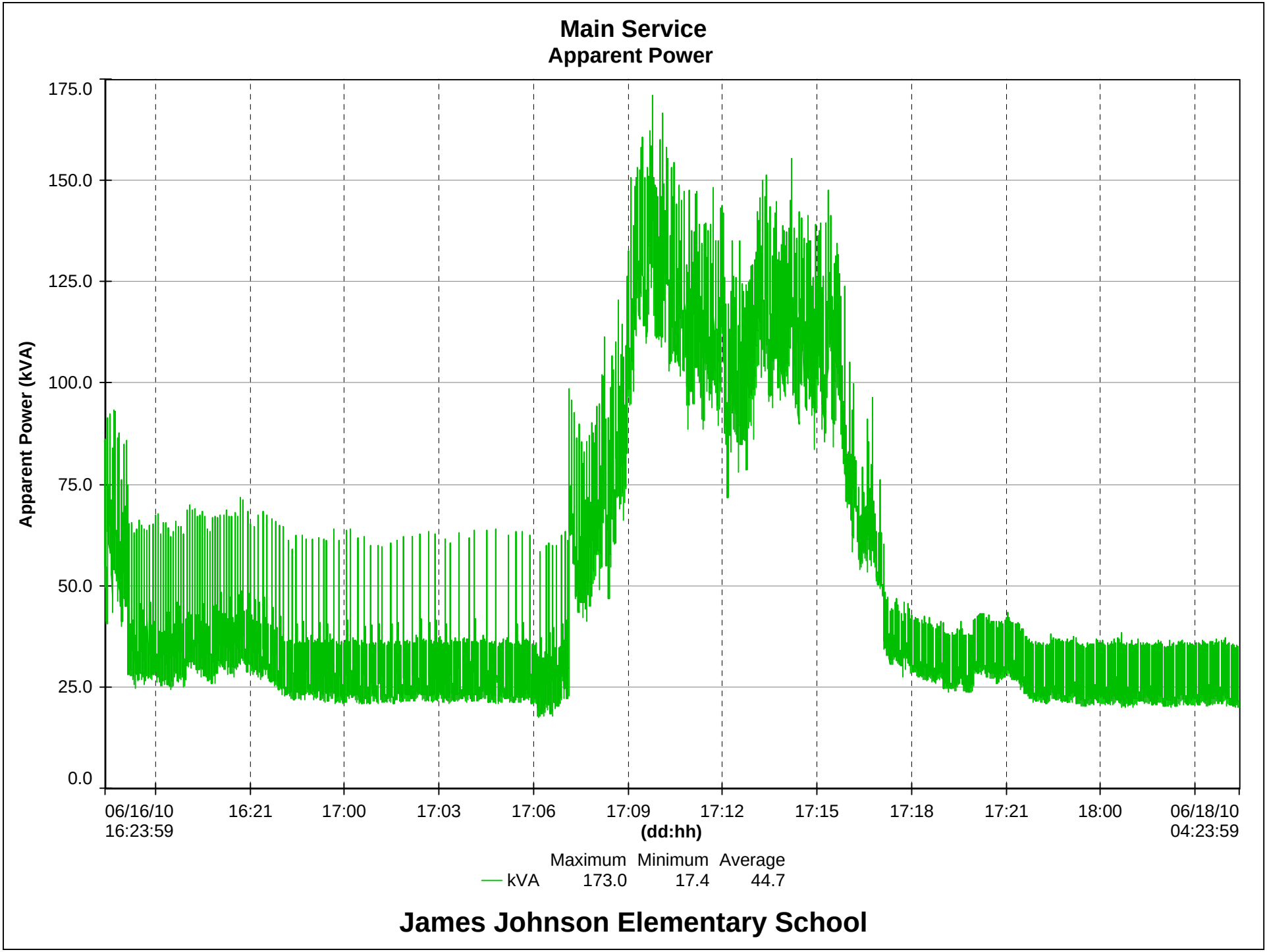
Cherry Hill School District

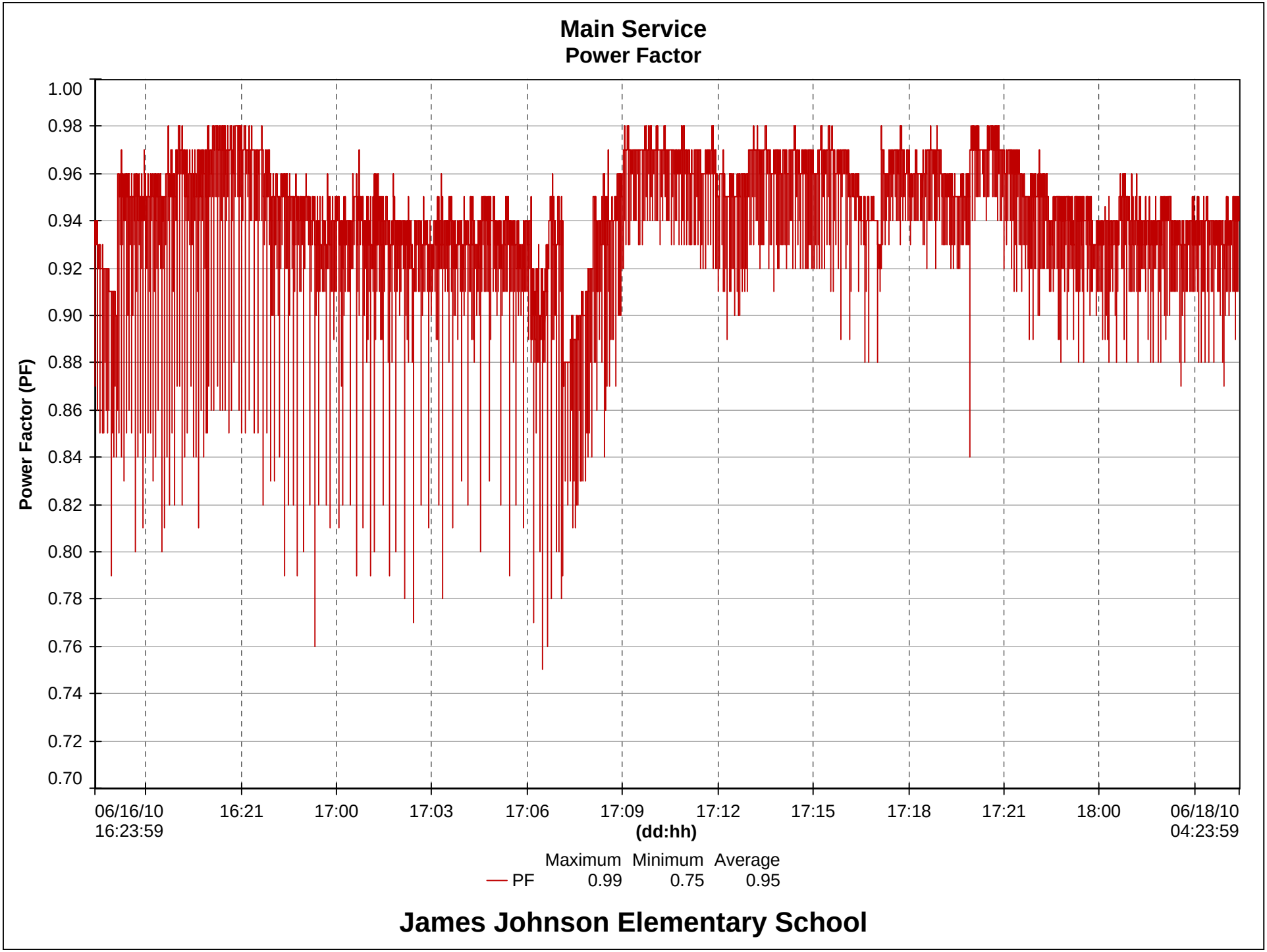

Main Service
Phase Voltage
AC Voltage (Vrms)
125.0
120.0
115.0
110.0
105.0
100.0
95.0
90.0
85.0
80.0
06/16/10
16:23:59
16:21
17:00
17:03
17:06
17:09
17:12
17:15
17:18
17:21
18:00
06/18/10
04:23:59
(dd:hh)
Maximum Minimum Average
Va 124.3 113.2 120.0
Vb 123.8 86.8 120.0
Vc 124.2 112.3 119.5
James Johnson Elementary School

Main Service
Line Current



James Johnson Elementary School


Main Service
Apparent Power
175.0
150.0
125.0
100.0
75.0
50.0
25.0
0.0
Apparent Power (kVA)
06/16/10
16:23:59
16:21
17:00
17:03
17:06
17:09
17:12
17:15
17:18
17:21
18:00
06/18/10
04:23:59
(dd:hh)
Maximum Minimum Average
kVA 173.0 17.4 44.7
James Johnson Elementary School


Main Service
Power Factor
Power Factor (PF)
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0.78
0.76
0.74
0.72
0.70
06/16/10
16:23:59
16:21
17:00
17:03
17:06
17:09
17:12
17:15
17:18
17:21
18:00
06/18/10
04:23:59
(dd:hh)
Maximum
Minimum
Average
PF
0.99
0.75
0.95
James Johnson Elementary School

Cherry Hill School District

James Johnson Elementary School
Load Study
15-Minute Data Averages

June 16 -18, 2010

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/16/10 16:38	118.2	118.8	117.5	166	143	165	55.9	0.93
6/16/10 16:53	117.8	118.6	117.5	159	141	157	53.9	0.92
6/16/10 17:08	118.0	118.8	117.3	142	129	139	48.3	0.91
6/16/10 17:23	118.7	119.1	118.1	93	75	86	30.1	0.95
6/16/10 17:38	118.8	119.2	118.9	89	83	82	30.1	0.95
6/16/10 17:53	118.8	119.3	118.8	105	69	81	30.3	0.95
6/16/10 18:08	119.3	119.4	118.7	95	76	85	30.4	0.95
6/16/10 18:23	119.2	119.4	119.5	88	70	84	28.9	0.95
6/16/10 18:38	119.4	119.7	119.0	88	71	82	28.7	0.95
6/16/10 18:53	119.6	120.0	119.4	84	82	87	30.2	0.96
6/16/10 19:08	119.9	119.9	119.7	94	83	91	32.0	0.96
6/16/10 19:23	119.5	120.2	119.9	100	81	93	32.8	0.96
6/16/10 19:38	120.1	120.9	119.9	93	76	88	30.8	0.96
6/16/10 19:53	120.0	120.7	120.0	88	74	85	29.6	0.96
6/16/10 20:08	120.1	120.7	120.2	93	82	90	32.0	0.96
6/16/10 20:23	120.3	120.3	119.7	91	84	94	32.3	0.97
6/16/10 20:38	120.1	120.1	120.0	91	81	92	31.7	0.97
6/16/10 20:53	119.4	119.8	119.8	99	88	93	33.5	0.97
6/16/10 21:08	119.6	120.0	119.8	94	80	89	31.4	0.97
6/16/10 21:23	120.2	120.5	120.2	91	76	84	30.1	0.97
6/16/10 21:38	120.5	120.9	120.7	93	77	83	30.4	0.97
6/16/10 21:53	120.8	121.5	120.9	86	72	79	28.6	0.96
6/16/10 22:08	120.9	121.1	121.1	80	65	72	26.2	0.95
6/16/10 22:23	119.0	120.0	119.6	80	64	67	25.3	0.95
6/16/10 22:38	119.8	120.2	119.8	74	62	65	24.0	0.95
6/16/10 22:53	119.7	119.9	120.1	77	64	68	25.0	0.94
6/16/10 23:08	120.2	120.5	120.5	75	64	65	24.5	0.94
6/16/10 23:23	120.9	120.9	121.0	76	64	64	24.7	0.94
6/16/10 23:38	121.1	121.2	120.9	76	62	60	23.9	0.93
6/16/10 23:53	121.6	121.2	121.3	77	63	62	24.4	0.94
6/17/10 0:08	122.0	121.9	121.6	74	59	60	23.5	0.94
6/17/10 0:23	121.8	121.5	121.3	77	62	60	24.1	0.93
6/17/10 0:38	121.0	120.6	120.8	72	62	59	23.3	0.94
6/17/10 0:53	121.3	120.5	120.8	73	65	61	24.0	0.94
6/17/10 1:08	121.3	120.6	120.9	76	62	58	23.6	0.93
6/17/10 1:23	121.3	120.7	121.1	74	62	58	23.4	0.93
6/17/10 1:38	121.5	120.9	121.3	76	60	60	23.6	0.94
6/17/10 1:53	121.6	120.9	121.4	77	61	61	24.2	0.93
6/17/10 2:08	121.9	121.4	121.5	71	61	58	23.1	0.93
6/17/10 2:23	121.9	121.5	121.8	76	62	60	24.1	0.93
6/17/10 2:38	122.5	121.7	122.0	74	63	60	24.0	0.93
6/17/10 2:53	122.5	121.6	122.1	73	62	58	23.6	0.93
6/17/10 3:08	122.3	121.7	121.8	78	62	58	24.1	0.93
6/17/10 3:23	122.4	121.7	121.7	75	60	60	23.8	0.93
6/17/10 3:38	122.6	121.7	121.8	72	61	56	23.1	0.93
6/17/10 3:53	122.6	121.8	122.0	78	62	59	24.1	0.93
6/17/10 4:08	122.7	121.9	122.0	74	64	59	24.0	0.93
6/17/10 4:23	122.5	121.7	121.7	74	62	58	23.5	0.93
6/17/10 4:38	122.2	121.7	121.9	77	62	59	24.0	0.93
6/17/10 4:53	122.2	121.5	122.0	74	59	59	23.4	0.94

Cherry Hill School District

James Johnson Elementary School
Load Study
15-Minute Data Averages

June 16 -18, 2010

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/17/10 5:08	122.1	121.3	121.5	74	60	55	22.9	0.93
6/17/10 5:23	122.2	121.1	121.5	73	62	57	23.4	0.93
6/17/10 5:38	122.1	121.5	121.9	73	62	58	23.4	0.93
6/17/10 5:53	121.9	121.3	121.7	77	61	58	23.8	0.92
6/17/10 6:08	121.6	121.0	121.1	72	57	57	22.6	0.93
6/17/10 6:23	121.1	120.8	120.8	70	48	50	20.2	0.90
6/17/10 6:38	120.7	120.4	120.7	76	53	53	21.8	0.90
6/17/10 6:53	120.5	120.1	120.1	77	58	59	23.3	0.93
6/17/10 7:08	119.9	119.2	119.4	86	67	70	26.6	0.93
6/17/10 7:23	118.1	117.4	118.2	179	157	165	58.9	0.88
6/17/10 7:38	118.1	117.5	117.6	151	119	139	48.1	0.89
6/17/10 7:53	117.5	117.2	117.3	162	126	148	51.1	0.90
6/17/10 8:08	117.7	117.2	117.5	175	152	165	57.6	0.92
6/17/10 8:23	117.0	116.6	117.0	190	182	186	65.3	0.94
6/17/10 8:38	117.0	116.1	116.6	190	190	192	66.6	0.94
6/17/10 8:53	116.7	116.1	116.4	228	218	221	77.6	0.95
6/17/10 9:08	115.9	115.8	115.5	286	270	268	95.2	0.96
6/17/10 9:23	115.6	115.6	115.1	352	331	329	116.8	0.97
6/17/10 9:38	116.4	116.4	115.7	367	332	351	122.0	0.97
6/17/10 9:53	115.6	116.3	114.9	392	354	375	129.4	0.97
6/17/10 10:08	115.6	116.1	115.0	376	341	351	123.4	0.97
6/17/10 10:23	115.6	116.1	114.5	355	339	343	119.7	0.97
6/17/10 10:38	115.5	115.6	114.2	325	330	333	113.8	0.97
6/17/10 10:53	115.3	115.4	114.0	314	321	323	110.0	0.97
6/17/10 11:08	115.5	115.7	114.5	300	300	298	103.4	0.97
6/17/10 11:23	116.3	117.3	115.6	315	306	303	107.4	0.96
6/17/10 11:38	117.6	118.2	116.8	300	292	293	104.0	0.96
6/17/10 11:53	117.1	117.9	116.4	309	297	280	103.8	0.97
6/17/10 12:08	117.2	117.8	115.8	300	295	281	102.5	0.96
6/17/10 12:23	116.9	117.7	116.4	275	244	249	89.9	0.95
6/17/10 12:38	117.0	117.6	115.7	271	261	257	92.0	0.95
6/17/10 12:53	116.7	117.1	115.9	263	262	249	90.3	0.96
6/17/10 13:08	116.2	116.7	115.8	300	289	279	100.7	0.96
6/17/10 13:23	115.5	116.4	114.9	339	330	309	113.1	0.97
6/17/10 13:38	115.7	116.2	115.3	320	304	287	105.3	0.97
6/17/10 13:53	115.7	115.7	114.6	307	314	298	105.9	0.96
6/17/10 14:08	115.8	115.9	114.4	296	303	310	104.8	0.96
6/17/10 14:23	115.7	115.6	114.2	310	316	316	108.5	0.96
6/17/10 14:38	115.4	115.5	114.0	296	314	308	105.4	0.96
6/17/10 14:53	115.6	115.4	114.2	292	292	295	101.1	0.96
6/17/10 15:08	116.1	116.6	115.4	289	296	291	101.6	0.96
6/17/10 15:23	116.4	117.1	115.8	292	288	289	101.1	0.96
6/17/10 15:38	116.2	117.8	115.6	300	282	291	101.6	0.97
6/17/10 15:53	116.7	118.2	116.2	280	250	280	94.8	0.96
6/17/10 16:08	117.5	118.2	116.8	197	204	202	70.8	0.96
6/17/10 16:23	117.9	118.8	117.0	181	188	181	64.8	0.96
6/17/10 16:38	118.1	119.0	117.6	169	175	148	58.1	0.94
6/17/10 16:53	118.3	118.9	117.5	171	180	147	58.8	0.94
6/17/10 17:08	118.7	119.5	118.9	150	156	120	50.7	0.93
6/17/10 17:23	119.8	120.5	120.0	110	94	78	33.9	0.96

Cherry Hill School District

James Johnson Elementary School
Load Study
15-Minute Data Averages

June 16 -18, 2010

Date / Time	Va	Vb	Vc	Ia	Ib	Ic	kVA	PF
6/17/10 17:38	120.4	120.9	120.5	107	91	73	32.6	0.96
6/17/10 17:53	120.6	121.1	120.6	111	80	73	31.8	0.97
6/17/10 18:08	120.9	121.6	120.5	103	75	72	30.3	0.96
6/17/10 18:23	121.4	122.1	121.0	97	68	71	28.7	0.96
6/17/10 18:38	121.7	122.2	121.4	95	64	73	28.2	0.96
6/17/10 18:53	119.6	120.2	119.3	96	66	70	27.8	0.97
6/17/10 19:08	119.8	120.9	119.9	96	62	67	26.9	0.96
6/17/10 19:23	119.7	120.7	120.0	92	59	60	25.5	0.95
6/17/10 19:38	120.1	120.9	120.4	94	63	63	26.5	0.95
6/17/10 19:53	120.3	121.2	120.6	87	59	61	24.9	0.95
6/17/10 20:08	120.9	121.2	120.4	93	68	71	28.0	0.97
6/17/10 20:23	121.2	121.6	120.9	100	73	72	29.8	0.97
6/17/10 20:38	121.4	121.5	121.0	95	69	71	28.5	0.97
6/17/10 20:53	121.0	121.1	120.8	93	68	70	27.9	0.97
6/17/10 21:08	121.4	121.3	121.4	97	74	69	29.1	0.97
6/17/10 21:23	122.0	122.0	121.6	92	68	69	27.8	0.96
6/17/10 21:38	122.1	121.9	121.5	83	63	66	25.8	0.96
6/17/10 21:53	121.4	121.3	120.9	74	60	62	23.6	0.95
6/17/10 22:08	121.8	121.8	121.2	69	58	61	22.7	0.95
6/17/10 22:23	121.9	122.3	121.5	68	55	61	22.4	0.95
6/17/10 22:38	122.3	122.1	121.9	74	57	61	23.4	0.94
6/17/10 22:53	123.1	122.6	122.2	69	57	60	22.8	0.94
6/17/10 23:08	123.1	122.6	122.5	70	56	60	22.7	0.94
6/17/10 23:23	123.1	122.8	122.7	71	55	57	22.5	0.94
6/17/10 23:38	123.5	123.1	123.1	69	52	55	21.6	0.94
6/17/10 23:53	122.8	122.4	122.4	71	55	56	22.3	0.93
6/18/10 0:08	122.9	122.3	122.1	72	55	55	22.3	0.93
6/18/10 0:23	122.9	122.5	122.4	69	56	55	22.1	0.94
6/18/10 0:38	123.3	122.8	122.7	73	56	54	22.5	0.93
6/18/10 0:53	123.6	123.2	122.7	69	52	54	21.6	0.95
6/18/10 1:08	123.0	122.6	122.2	71	54	53	21.8	0.94
6/18/10 1:23	122.2	121.9	121.6	74	56	54	22.4	0.93
6/18/10 1:38	122.5	122.0	121.8	71	56	55	22.2	0.94
6/18/10 1:53	122.5	122.3	122.0	71	55	55	22.0	0.93
6/18/10 2:08	122.5	122.2	121.7	71	53	56	21.9	0.94
6/18/10 2:23	122.9	122.3	121.9	68	54	54	21.6	0.94
6/18/10 2:38	123.0	122.6	122.2	72	56	53	22.3	0.93
6/18/10 2:53	123.1	122.8	122.4	69	56	54	21.9	0.93
6/18/10 3:08	123.2	122.9	122.6	70	55	54	21.9	0.94
6/18/10 3:23	123.2	123.0	122.5	73	53	55	22.1	0.94
6/18/10 3:38	123.4	123.0	122.6	69	55	55	22.0	0.93
6/18/10 3:53	123.4	123.1	122.7	69	56	55	22.2	0.93
6/18/10 4:08	123.0	122.8	122.3	72	55	54	22.3	0.93
6/18/10 4:23	122.6	122.3	121.9	69	54	53	21.5	0.94
6/18/10 4:23	122.8	122.5	122.0	68	53	53	21.4	0.94