
# Local Government Energy Audit Report

## Thomas Wallace Middle School

## January 3, 2020

*Prepared for:*

Vineland Public Schools
688 North Mill Road
Vineland, NJ 08360

*Prepared by:*

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# Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

TRC reviewed the energy conservation measures and estimates of energy savings were reviewed for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. TRC and the New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. Cost estimates include material and labor pricing associated with installation of primary recommended equipment only. Cost estimates do not include demolition or removal of hazardous waste. We encourage the owner of the facility to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual measures and conditions. TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

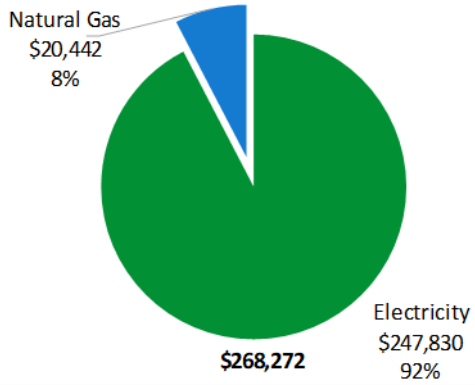
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

# Table of Contents

# 1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Thomas Wallace Middle School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

## BUILDING PERFORMANCE REPORT

| | | |
|---|---|---|
| Annual Utilities | Costs: $268,272<br><br>Electricity:<br>1,620,178 kWh<br><br>Natural Gas:<br>14,576 Therms |  |
| ENERGY STAR® Benchmarking Score | 24<br>*(1-100 scale)* | This building performs below the national average. This report contains suggestions about how to improve building performance and reduce energy costs. |

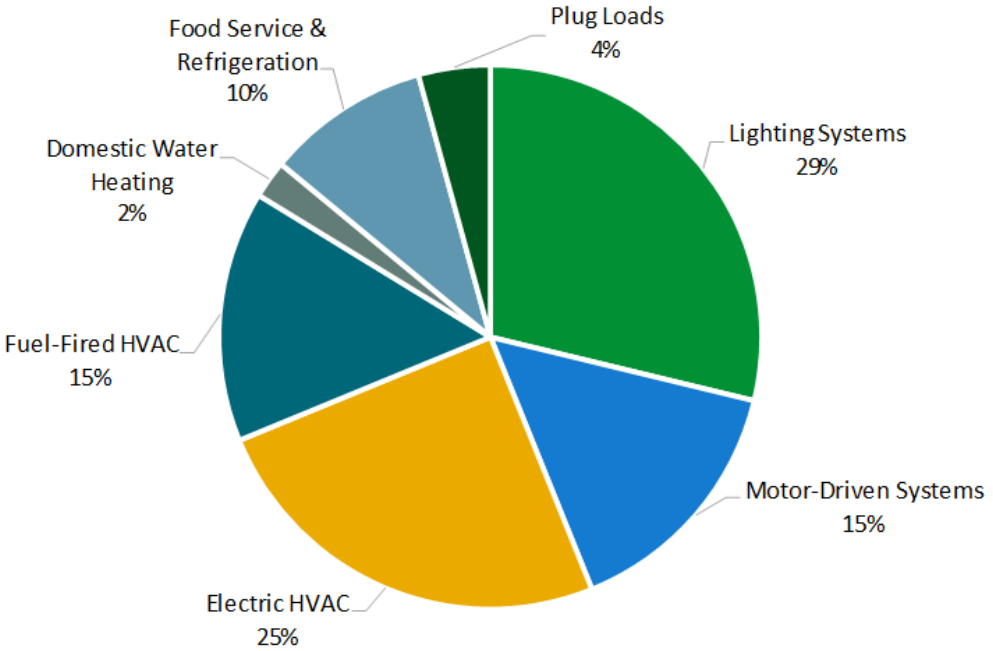


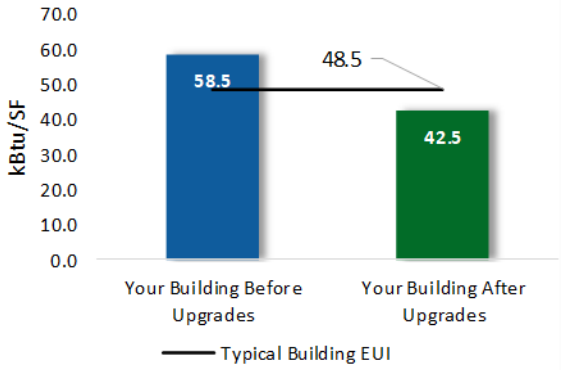

*Figure 1 - Energy Use by System*

## POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

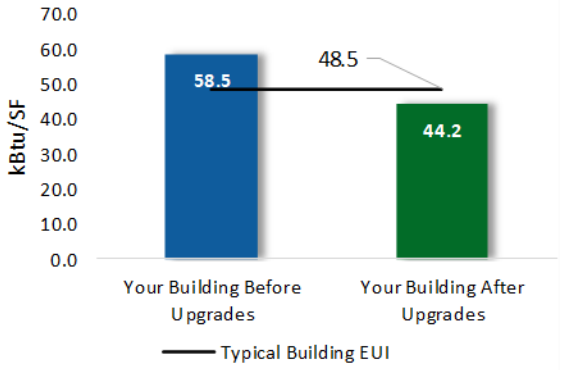
### Scenario 1: Full Package (all evaluated measures)

| | |
|---|---|
| Installation Cost | $674,631 |
| Potential Rebates & Incentives[1] | $102,913 |
| Annual Cost Savings | $83,390 |
| Annual Energy Savings | Electricity: 537,670 kWh<br>Natural Gas: 817 Therms |
| Greenhouse Gas Emission Savings | 275 Tons |
| Simple Payback | 6.9 Years |
| Site Energy Savings (all utilities) | 27% |




### Scenario 2: Cost Effective Package[2]

| | |
|---|---|
| Installation Cost | $316,624 |
| Potential Rebates & Incentives | $73,382 |
| Annual Cost Savings | $75,346 |
| Annual Energy Savings | Electricity: 488,446 kWh<br>Natural Gas: 450 Therms |
| Greenhouse Gas Emission Savings | 249 Tons |
| Simple Payback | 3.2 Years |
| Site Energy Savings (all utilities) | 25% |




### On-site Generation Potential

| | |
|---|---|
| Photovoltaic | Medium |
| Combined Heat and Power | None |

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **343,671** | **53.9** | **-58** | **$51,758** | **$185,058** | **$0** | **$185,058** | **3.6** | **339,303** |
| ECM 1 | Install LED Fixtures | Yes | 116,857 | 9.8 | -11 | $17,726 | $113,526 | $0 | $113,526 | 6.4 | 116,431 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 226,814 | 44.1 | -47 | $34,032 | $71,532 | $0 | $71,532 | 2.1 | 222,872 |
| **Lighting Control Measures** | | | **71,053** | **13.8** | **-15** | **$10,660** | **$48,420** | **$0** | **$48,420** | **4.5** | **69,810** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 65,997 | 12.8 | -14 | $9,902 | $42,120 | $0 | $42,120 | 4.3 | 64,843 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 5,055 | 1.0 | -1 | $758 | $6,300 | $0 | $6,300 | 8.3 | 4,967 |
| **Motor Upgrades** | | | **1,370** | **0.4** | **0** | **$210** | **$10,027** | **$0** | **$10,027** | **47.9** | **1,379** |
| ECM 5 | Premium Efficiency Motors | No | 1,370 | 0.4 | 0 | $210 | $10,027 | $0 | $10,027 | 47.9 | 1,379 |
| **Variable Frequency Drive (VFD) Measures** | | | **68,165** | **15.7** | **118** | **$12,077** | **$77,530** | **$0** | **$77,530** | **6.4** | **82,421** |
| ECM 6 | Install VFDs on Constant Volume (CV) Fans | Yes | 41,228 | 13.5 | 0 | $6,306 | $51,536 | $0 | $51,536 | 8.2 | 41,516 |
| ECM 7 | Install VFDs on Chilled Water Pumps | Yes | 4,490 | 1.0 | 0 | $687 | $4,076 | $0 | $4,076 | 5.9 | 4,521 |
| ECM 8 | Install VFDs on Heating Water Pumps | Yes | 8,997 | 1.1 | 0 | $1,376 | $13,788 | $0 | $13,788 | 10.0 | 9,060 |
| ECM 9 | Install VFDs on Kitchen Hood Fan Motors | Yes | 13,450 | 0.1 | 118 | $3,708 | $8,129 | $0 | $8,129 | 2.2 | 27,324 |
| **Electric Unitary HVAC Measures** | | | **28,531** | **11.5** | **0** | **$4,364** | **$250,632** | **$0** | **$250,632** | **57.4** | **28,730** |
| ECM 10 | Install High Efficiency Air Conditioning Units | No | 2,384 | 1.4 | 0 | $365 | $17,955 | $0 | $17,955 | 49.2 | 2,401 |
| ECM 11 | Install High Efficiency Heat Pumps | No | 26,146 | 10.1 | 0 | $3,999 | $232,677 | $0 | $232,677 | 58.2 | 26,329 |
| **Electric Chiller Replacement** | | | **7,604** | **6.4** | **0** | **$1,163** | **$30,251** | **$0** | **$30,251** | **26.0** | **7,657** |
| ECM 12 | Install High Efficiency Chillers | No | 7,604 | 6.4 | 0 | $1,163 | $30,251 | $0 | $30,251 | 26.0 | 7,657 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **37** | **$515** | **$28,095** | **$2,400** | **$25,695** | **49.9** | **4,298** |
| ECM 13 | Install High Efficiency Furnaces | No | 0 | 0.0 | 37 | $515 | $28,095 | $2,400 | $25,695 | 49.9 | 4,298 |
| **HVAC System Improvements** | | | **3,987** | **0.0** | **0** | **$610** | **$19,032** | **$0** | **$19,032** | **31.2** | **4,015** |
| ECM 14 | Implement Demand Control Ventilation (DCV) | No | 3,987 | 0.0 | 0 | $610 | $19,032 | $0 | $19,032 | 31.2 | 4,015 |
| **Food Service & Refrigeration Measures** | | | **13,290** | **0.8** | **0** | **$2,033** | **$25,586** | **$0** | **$25,586** | **12.6** | **13,383** |
| ECM 15 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 3,603 | 0.4 | 0 | $551 | $5,156 | $0 | $5,156 | 9.4 | 3,628 |
| ECM 16 | Refrigeration Controls | No | 7,733 | 0.2 | 0 | $1,183 | $19,970 | $0 | $19,970 | 16.9 | 7,787 |
| ECM 17 | Vending Machine Control | Yes | 1,954 | 0.2 | 0 | $299 | $460 | $0 | $460 | 1.5 | 1,968 |
| **TOTALS (COST EFFECTIVE MEASURES)** | | | **488,446** | **84.1** | **45** | **$75,346** | **$316,624** | **$0** | **$316,624** | **4.2** | **497,130** |
| **TOTALS (ALL MEASURES)** | | | **537,670** | **102.4** | **82** | **$83,390** | **$674,631** | **$2,400** | **$672,231** | **8.1** | **550,996** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

*Figure 2 – Evaluated Energy Improvements*

For more detail on each evaluated energy improvement and a break out of cost-effective improvements, see **Section 4: Energy Conservation Measures**.

## 1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

### Pick Your Installation Approach

New Jersey's Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building qualify for incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

| Energy Conservation Measure | | SmartStart | Direct Install | Pay For Performance |
|---|---|---|---|---|
| ECM 1 | Install LED Fixtures | | | |
| ECM 2 | Retrofit Fixtures with LED Lamps | | | |
| ECM 3 | Install Occupancy Sensor Lighting Controls | | | |
| ECM 4 | Install High/Low Lighting Controls | | | |
| ECM 5 | Premium Efficiency Motors | | | |
| ECM 6 | Install VFDs on Constant Volume (CV) Fans | | | |
| ECM 7 | Install VFDs on Chilled Water Pumps | | | |
| ECM 8 | Install VFDs on Heating Water Pumps | | | |
| ECM 9 | Install VFDs on Kitchen Hood Fan Motors | | | |
| ECM 10 | Install High Efficiency Air Conditioning Units | | | |
| ECM 11 | Install High Efficiency Heat Pumps | | | |
| ECM 12 | Install High Efficiency Chillers | | | |
| ECM 13 | Install High Efficiency Furnaces | X | | X |
| ECM 14 | Implement Demand Control Ventilation (DCV) | | | |
| ECM 15 | Refrigerator/Freezer Case Electrically Commutated Motors | | | |
| ECM 16 | Refrigeration Controls | | | |
| ECM 17 | Vending Machine Control | | | |

*Figure 3 – Funding Options*

## New Jersey's Clean Energy Programs At-A-Glance

| | **SmartStart**<br>Flexibility to install at your own pace | **Direct Install**<br>Turnkey installation | **Pay for Performance**<br>Whole building upgrades |
|---|---|---|---|
| **Who should use it?** | Buildings installing individual measures or small group of measures. | Small to mid-size facilities that can bundle multiple measures together.<br>Average peak demand should be below 200 kW.<br>Not suitable for significant building shell issues. | Mid to large size facilities looking to implement as many measures as possible at one time.<br>Peak demand should be over 200 kW. |
| **How does it work?** | Use in-house staff or your preferred contractor. | Pre-approved contractors pass savings along to you via reduced material and labor costs. | Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives. |
| **What are the Incentives?** | Fixed incentives for specific energy efficiency measures. | Incentives pay up to 70% of eligible costs, up to $125,000 per project.<br>You pay the remaining 30% directly to the contractor. | Up to 25% of installation cost, calculated based on level of energy savings per square foot. |
| **How do I participate?** | Submit an application for the specific equipment to be installed. | Contact a participating contractor in your region. | Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets. |

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

*Individual Measures with SmartStart*

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

*Turnkey Installation with Direct Install*

The Direct Install program provides turnkey installation of multiple measures through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures. Direct Install contractors will assess and verify individual measure eligibility and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

*Whole Building Approach with Pay for Performance*

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings.

## More Options from Around the State

*Financing and Planning Support with the Energy Savings Improvement Program (ESIP)*

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the ESIP. Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

*Resiliency with Return on Investment through Combined Heat & Power (CHP)*

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

*Ongoing Electric Savings with Demand Response*

The Demand Response Energy Aggregator program reduces electric loads at commercial facilities when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. By enabling commercial facilities to reduce electric demand during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

# 2 EXISTING CONDITIONS

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Thomas Wallace Middle School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

## 2.1 Site Overview

On August 8, 2019, TRC performed an energy audit at Thomas Wallace Middle School located in Vineland, New Jersey. TRC met with Gene Mercoli to review the facility operations and help focus our investigation on specific energy-using systems.

Thomas Wallace Middle School is a two-story, 119,380 square foot building built in 2006. Spaces include: classrooms, gymnasium, auditorium, a library, offices, cafeteria, corridors, stairwells, a school kitchen and electrical and mechanical spaces. The facility houses the school district central kitchen.

The school is 100% cooled and heated. There are no envelope concerns as the building is fairly new. The HVAC equipment includes water source heat pump systems.

## 2.2 Building Occupancy

The facility is occupied ten months of the year, when school is in session. Typical weekday occupancy is 658 staff and students.

There are no weekend or summer activities.

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Thomas Wallace Middle School | Weekday | 6:00 AM to 11:00 PM |
| | Weekend | Closed |

*Figure 4 - Building Occupancy Schedule*

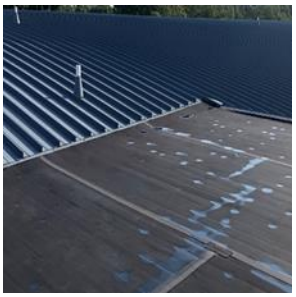
## 2.3 Building Envelope

Building walls are brick masonry over structural steel. Portions of the walls are made of panel glass. Part of the building has a flat roof covered with black membrane, and other portions are covered with a curved metal roof. Both sections are in good condition. The interior walls have a gypsum drywall finish.

Most of the windows are double-pane glazed with low-e glass and have aluminum frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. There are four metallic rollup doors at the loading dock area.

*BrickMmasonry Walls*

*Panel Glass Walls*



*Metallic and Black Membrane Roofs*

*Windows*

*Entrance Doors*


*Exit Doors*

## 2.4 Lighting Systems

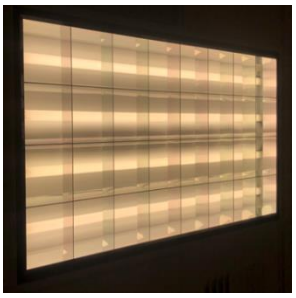
The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are compact fluorescent lamps (CFL), incandescent, high intensity discharge (HID), and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fluorescent fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long recessed or surface mounted fixtures and 2-foot fixtures with U-bend or linear tube lamps.

Gymnasium and auditorium fixtures have high bay high intensity discharge (HID) lamps and are manually controlled. The auditorium also has several halogen lamps for accent and stage lighting. The CFL fixtures are found in spaces such as “A” wing hallway, main lobby, library, and the conference room. The cold prep room of the central kitchen has some LED linear tubes.

All exit signs are LED units. The fixtures are in good condition. Interior lighting fixtures are controlled manually by wall switches. Interior lighting levels were generally sufficient.

Exterior fixtures include wall packs, canopy lights, and pole fixtures with high intensity discharge (HID), CFL, or LED lamps. The pole-mounted flood fixtures have with high intensity discharge (HID), or LED sources. Exterior fixtures are time clock controlled.



*4-Foot Linear Fluorescent T8*

*U-Shape Fluorescent T8*

*Auditorium HID Lights*

*HID Wall Pack Fixture*

*LED Wall Pack Fixture*

*HID Pole Mounted Fixture*

## 2.5 Air Handling Systems

### Air-Handlers

The school has two make-up air units with indirect-fired furnaces, one air handler with a gas-fired furnace, and a blower coil unit with electric resistance heating. Each unit has a constant volume supply fan with motors between ½ hp and 10 hp each. Only the blower coil unit receives chilled water and has cooling. The units are original to the building and are controlled by a Trane EMS.

### Packaged and Split-system Units

The school is served by multiple packaged and split-system roof top units, including:

| (Quantity) Unit | Area Served | Size | Efficiency |
|---|---|---|---|
| (7) Packaged Air-Source HP | Main Lobby, Cafeteria, Music Room, Gym, Library | 10 tons cooling<br>108 MBh heating | 10.1 EER<br>3.3 COP |
| (2) Packaged Air-Source HP | Auditorium | 15 tons cooling<br>166 MBh heating | 9.6 EER<br>3.1 COP |
| (2) Packaged Air-Source HP | Stage, School Kitchen | 7.5 tons cooling<br>88 MBh heating | 10.1 EER<br>3.2 COP |
| (4) Split-System AC | Server Rooms, Central Kitchen | 3 tons cooling | 11 EER |
| (1) Split-System AC | Central Kitchen | 60 tons cooling | 11.2 EER |

The packaged and split system units are 13 years old, have reached their useful life, and appear in fair condition except the 60-ton air-cooled condensing unit serving the central kitchen that appears in good condition. The remaining packaged and split system units have been evaluated for replacement. The packaged units are equipped with an economizer that opens to draw in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy. The packaged units are controlled with the EMS while the small split system units are controlled with programmable thermostats.

Refer to Appendix A for detailed information about each unit.

*Trane Make UP Air Unit*

*Trane AC Condensing Unit*

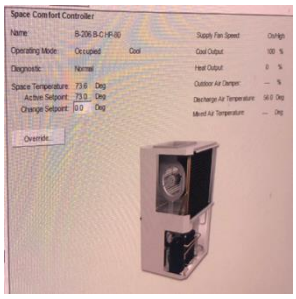
*Packaged Heat Pump Unit*

*Split System Unit*

**Water-Source Heat Pumps**

According to the site, there are 147 wells and approximately 88 water source heat pumps (WSHP) throughout the facility. Most of the water source heat pumps are ceiling mounted. They provide cooling and heating to various spaces such as classrooms and offices. Units either have 1.5-ton cooling capacity with 14 EER and 22.1 MBh heating capacity with 4.2 COP or 3.5-ton cooling capacity with 12.8 EER and 48.5 MBh heating capacity with 4 COP. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year-round, which makes the earth an ideal heat source and heat sink for heat pumps. The units are controlled using a Trane Summit energy management system (EMS).

Supplemental heat is provided in spaces such as mechanical and electrical rooms by electrical resistance heaters when needed. They are controlled with local thermostats.



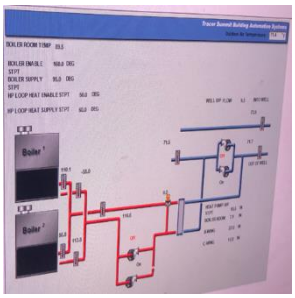

*Water Source Heat Pumps*

## 2.6 Heating Hot Water System

Connected to the geothermal water loop are two Lochinvar 1,720 MBh condensing hot water boilers. The burners are fully-modulating with a nominal efficiency of 86%. The boilers are configured in a lead-lag control scheme. Both boilers are required under high load conditions.

The boilers add heat to the water loop during winter months when most units are heating. The boilers are typically enabled when the water loop temperature falls to a minimum value. The boilers serve a primary-secondary distribution system with two, 3 hp and two, 1 hp constant speed pumps circulating the primary loop and two VFD-controlled 50 hp heating hot water pumps operating in lead/lag fashion on the secondary loop. Hot water is also supplied to unit heaters. The boilers are between their useful lives and appear in good condition. Hot water system is controlled by a Trane EMS.

*Condensing Boilers*



*Hot Water Loop Control System*


*50 hp Hot Water Pumps*


*Variable Speed Drive*

## 2.7 Process Steam System

There is one Fulton 1,005 MBh steam boiler that serves the central kitchen process heating loads used in food preparation. The burner is fully modulating with a nominal efficiency of 79%. The system uses a 7.5 hp air compressor. The boiler is in good condition.

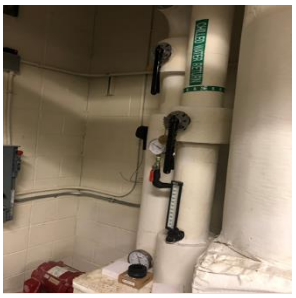
*Steam Boiler*

*Air Compressor*

## 2.8 Chilled Water Systems

The chiller plant consists of a 22-ton Carrier Aquasnap air-cooled scroll chiller located on the ground. Chilled water is supplied by a dedicated 5 hp primary pump. The chiller supplies chilled water to air handlers and blower coil units serving the central kitchen. The chiller is original to building.

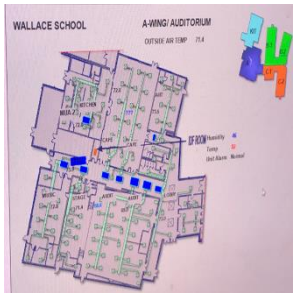
*Air-Cooled Chiller*

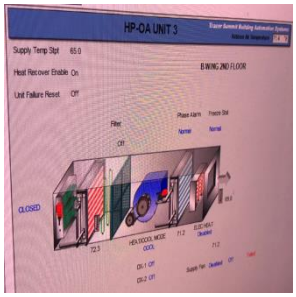


*Chilled Water Pump*

## 2.9 Building Energy Management Systems (EMS)

A Trane Tracer Summit EMS controls the HVAC equipment, air handlers, and package units. The EMS provides equipment scheduling control and monitors space temperatures humidity and heating water loop temperatures




*Trane Tracer EMS*

## 2.10 Domestic Hot Water

Hot water for the central kitchen part of the facility is produced with an AO Smith 300 MBh gas-fired boiler with an 84% efficiency. The rest of the facility receives domestic hot water from two AO Smith 750 MBh gas-fired boilers, each with an 84% efficiency. Each system has a separate tank that stores hot water for use. The units are in good condition and the pipes well insulated.

*Central Kitchen DWH*

*School DWH*

*Central Kitchen Storage Tank*

## 2.11 Food Service Equipment

The school has two kitchens. One kitchen is used to prepare meals for other schools within the district (central kitchen), and the other is used to prepare meals for staff and students at the school. Each kitchen has a mix of gas and electric equipment. Most cooking in the central kitchen is done using two large steam kettles and a large industrial convention gas-fired oven. Convection ovens are used in the school kitchen to do most of the cooking. Bulk prepared foods are held in several electric holding cabinets. Equipment is high efficiency and is in good condition.

The dishwasher, in the school kitchen, is an ENERGY STAR® high temperature, door-type unit. The dishwasher has a 24-kW booster heater.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

*Gas-Fired Cooking Equipment*

*Industrial Oven*

*Electric Dishwasher*

*Steamers*

## 2.12 Refrigeration

The school kitchen has several stand-up refrigerators with solid doors. There are also many milk cooler refrigerator chests. All equipment is high efficiency and in good condition.

The central kitchen has several walk-in freezers and coolers used to store food and beverages for other schools in the district as well as for the school itself. The walk-in refrigerators have an estimated ¾-ton to 1-ton compressors each located outside adjacent to the central kitchen or school kitchen and a two-fan or three-fan evaporator each.

The walk-in low temperature freezers have a ½-ton compressor each located outside adjacent to the central or school kitchen and a two-fan evaporator each. Each walk-in freezer also has a 1.7 kW defrost heater.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

*Reach in Refrigerator and Freezer*

*Walk-in Cooler*

*Ice Machine*

*Central Kitchen Walk-ins Condensing Unit*

*School Kitchen Walk-ins Condensing Units*

*Walk-in Unit Evaporator*

## 2.13 Plug Load & Vending Machines

You may wish to consider paying particular attention to minimizing your plug load usage. This report makes suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 50 computer work stations and 450 laptops throughout the facility. Plug loads throughout the building include general café and office equipment. There are typical loads such as printers, water coolers, and televisions.

There are several residential-style refrigerators throughout the building that are used to store food and beverages. These vary in condition and efficiency.

There is one refrigerated beverage vending machine and one non-refrigerated vending machine. Vending machines are not equipped with occupancy-based controls.

*Washer/Dryer*


*Vending Machine*

*Kiln*

## 2.14 Water-Using Systems

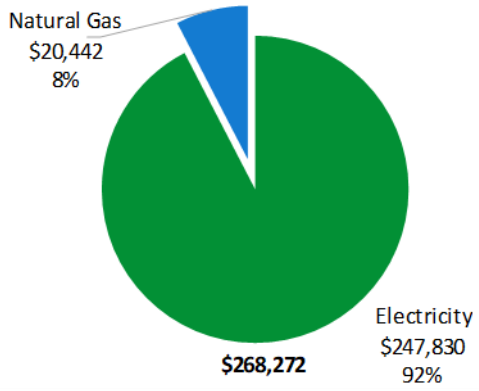
There are restrooms with toilets, urinals, and sinks. Faucet flow rates are all low-flow rated. Toilets and urinals are also all low-flow rated.

*Restrooms Lavatory Sinks*

# 3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

| Utility Summary | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 1,620,178 kWh | $247,830 |
| Natural Gas | 14,576 Therms | $20,442 |
| **Total** | | **$268,272** |




An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

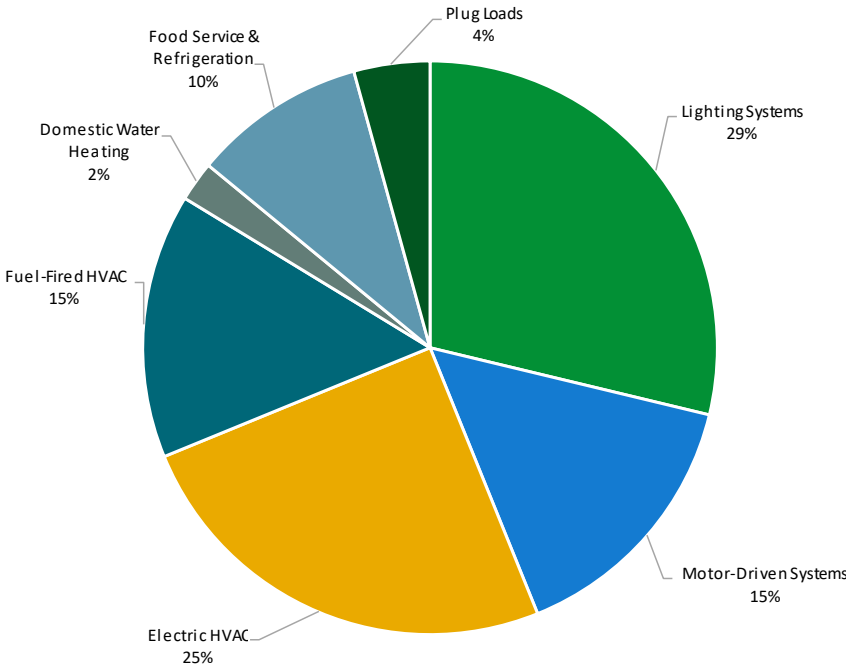
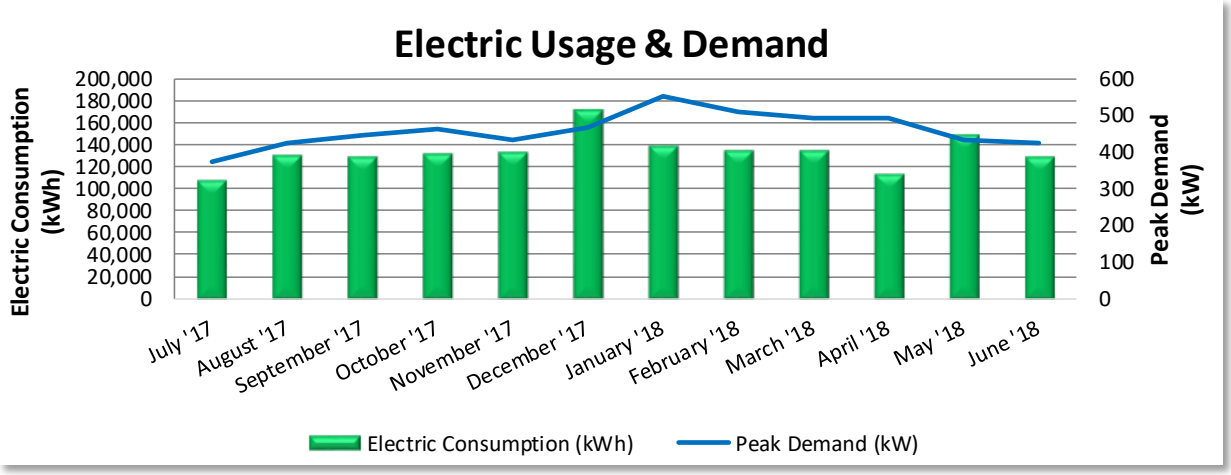



*Figure 5 - Energy Balance*

## 3.1 Electricity

City of Vineland delivers and produces electricity under rate class GLP20.



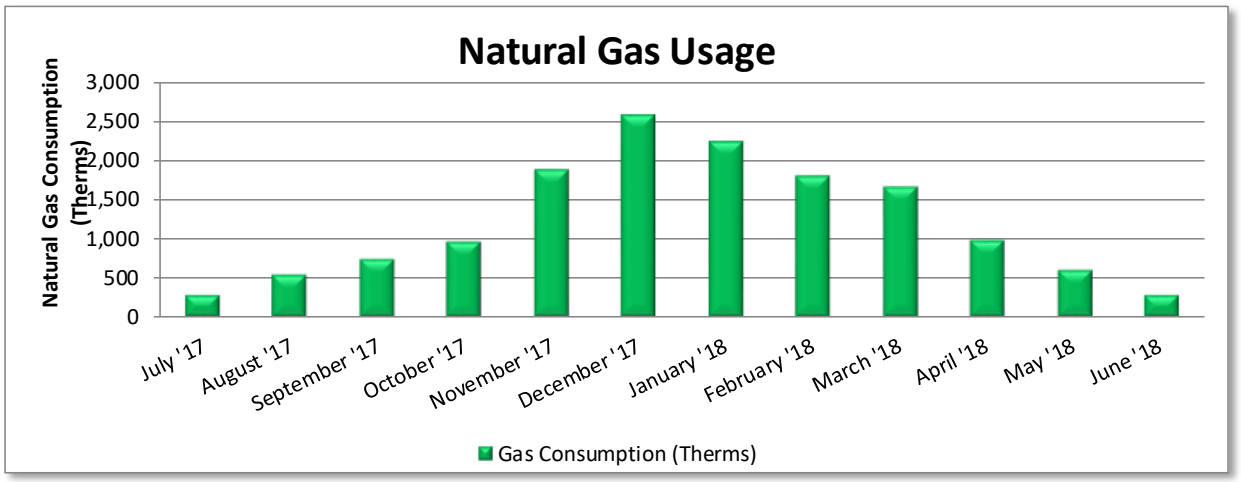

| Electric Billing Data | | | | | |
|---|---|---|---|---|---|
| **Period Ending** | **Days in Period** | **Electric Usage (kWh)** | **Demand (kW)** | **Demand Cost** | **Total Electric Cost** |
| 8/3/17 | 27 | 107,700 | 375 | $2,531 | $15,359 |
| 9/8/17 | 36 | 131,100 | 425 | $4,144 | $19,485 |
| 10/5/17 | 27 | 129,600 | 447 | $4,247 | $18,840 |
| 11/3/17 | 29 | 132,900 | 462 | $4,389 | $19,352 |
| 12/6/17 | 33 | 134,400 | 432 | $4,104 | $19,234 |
| 1/8/18 | 33 | 172,200 | 468 | $4,446 | $23,806 |
| 2/5/18 | 28 | 138,900 | 555 | $5,273 | $21,601 |
| 3/6/18 | 29 | 135,900 | 510 | $4,845 | $20,823 |
| 4/6/18 | 31 | 135,000 | 492 | $5,043 | $22,266 |
| 5/3/18 | 27 | 114,600 | 492 | $5,043 | $19,677 |
| 6/5/18 | 33 | 149,100 | 432 | $4,536 | $24,407 |
| 7/5/18 | 30 | 129,900 | 426 | $4,473 | $21,623 |
| **Totals** | **363** | **1,611,300** | **555** | **$53,073** | **$246,472** |
| **Annual** | **365** | **1,620,178** | **555** | **$53,365** | **$247,830** |

Notes:

- Peak demand of 555 kW occurred in January 2018.
- Average demand over the past 12 months was 460 kW.
- The average electric cost over the past 12 months was $0.153/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.
- Electricity consumption is relatively consistent month to month because of the heat pump equipment, which is used for both heating and cooling year-round.

## 3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service FT, with natural gas supply provided by South Jersey Energy, a third-party supplier.




| Gas Billing Data | | | |
|---|---|---|---|
| **Period Ending** | **Days in Period** | **Natural Gas Usage (Therms)** | **Natural Gas Cost** |
| 8/10/17 | 29 | 291 | $412 |
| 9/14/17 | 35 | 541 | $709 |
| 10/11/17 | 27 | 753 | $929 |
| 11/9/17 | 29 | 959 | $1,197 |
| 12/11/17 | 32 | 1,894 | $2,594 |
| 1/12/18 | 32 | 2,587 | $4,046 |
| 2/12/18 | 31 | 2,249 | $3,181 |
| 3/13/18 | 29 | 1,800 | $2,573 |
| 4/12/18 | 30 | 1,674 | $2,364 |
| 5/11/18 | 29 | 986 | $1,232 |
| 6/13/18 | 33 | 603 | $827 |
| 7/13/18 | 30 | 278 | $434 |
| **Totals** | **366** | **14,616** | **$20,498** |
| **Annual** | **365** | **14,576** | **$20,442** |

Notes:

- The average gas cost for the past 12 months is $1.402/therm, which is the blended rate used throughout the analysis.
- Gas consumption is greatest during winter months due to the supplemental heating load provided by gas-fired boilers.

## 3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

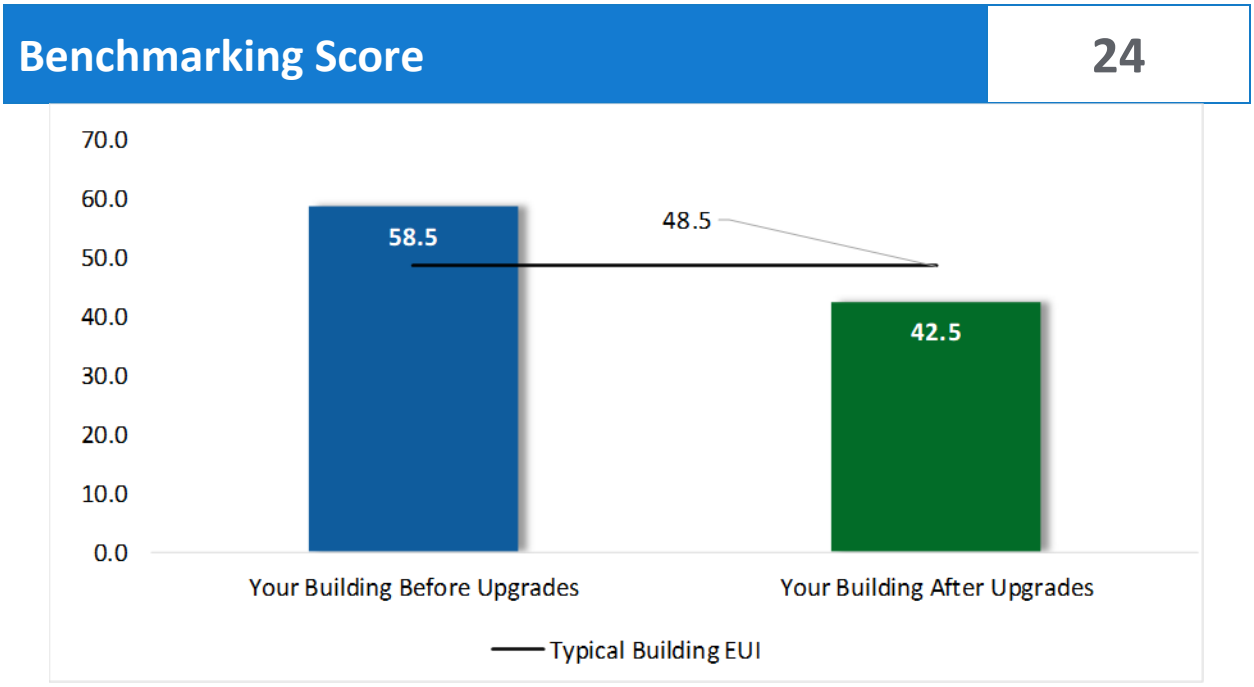



*Figure 6 - Energy Use Intensity Comparison*[3]

This building performs below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause a building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

[3] Based on all evaluated ECMs

## Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

**We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.**

Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building's performance at: https://www.energystar.gov/buildings/training.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website[4].

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

# 4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

For a detailed list of the locations and recommended energy conservation measures for all inventoried equipment, see Appendix A: Equipment Inventory & Recommendations

| # | Energy Conservation Measure | Cost Effective? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **343,671** | **53.9** | **-58** | **$51,758** | **$185,058** | **$0** | **$185,058** | **3.6** | **339,303** |
| ECM 1 | Install LED Fixtures | Yes | 116,857 | 9.8 | -11 | $17,726 | $113,526 | $0 | $113,526 | 6.4 | 116,431 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 226,814 | 44.1 | -47 | $34,032 | $71,532 | $0 | $71,532 | 2.1 | 222,872 |
| **Lighting Control Measures** | | | **71,053** | **13.8** | **-15** | **$10,660** | **$48,420** | **$0** | **$48,420** | **4.5** | **69,810** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | Yes | 65,997 | 12.8 | -14 | $9,902 | $42,120 | $0 | $42,120 | 4.3 | 64,843 |
| ECM 4 | Install High/Low Lighting Controls | Yes | 5,055 | 1.0 | -1 | $758 | $6,300 | $0 | $6,300 | 8.3 | 4,967 |
| **Motor Upgrades** | | | **1,370** | **0.4** | **0** | **$210** | **$10,027** | **$0** | **$10,027** | **47.9** | **1,379** |
| ECM 5 | Premium Efficiency Motors | No | 1,370 | 0.4 | 0 | $210 | $10,027 | $0 | $10,027 | 47.9 | 1,379 |
| **Variable Frequency Drive (VFD) Measures** | | | **68,165** | **15.7** | **118** | **$12,077** | **$77,530** | **$0** | **$77,530** | **6.4** | **82,421** |
| ECM 6 | Install VFDs on Constant Volume (CV) Fans | Yes | 41,228 | 13.5 | 0 | $6,306 | $51,536 | $0 | $51,536 | 8.2 | 41,516 |
| ECM 7 | Install VFDs on Chilled Water Pumps | Yes | 4,490 | 1.0 | 0 | $687 | $4,076 | $0 | $4,076 | 5.9 | 4,521 |
| ECM 8 | Install VFDs on Heating Water Pumps | Yes | 8,997 | 1.1 | 0 | $1,376 | $13,788 | $0 | $13,788 | 10.0 | 9,060 |
| ECM 9 | Install VFDs on Kitchen Hood Fan Motors | Yes | 13,450 | 0.1 | 118 | $3,708 | $8,129 | $0 | $8,129 | 2.2 | 27,324 |
| **Electric Unitary HVAC Measures** | | | **28,531** | **11.5** | **0** | **$4,364** | **$250,632** | **$0** | **$250,632** | **57.4** | **28,730** |
| ECM 10 | Install High Efficiency Air Conditioning Units | No | 2,384 | 1.4 | 0 | $365 | $17,955 | $0 | $17,955 | 49.2 | 2,401 |
| ECM 11 | Install High Efficiency Heat Pumps | No | 26,146 | 10.1 | 0 | $3,999 | $232,677 | $0 | $232,677 | 58.2 | 26,329 |
| **Electric Chiller Replacement** | | | **7,604** | **6.4** | **0** | **$1,163** | **$30,251** | **$0** | **$30,251** | **26.0** | **7,657** |
| ECM 12 | Install High Efficiency Chillers | No | 7,604 | 6.4 | 0 | $1,163 | $30,251 | $0 | $30,251 | 26.0 | 7,657 |
| **Gas Heating (HVAC/Process) Replacement** | | | **0** | **0.0** | **37** | **$515** | **$28,095** | **$2,400** | **$25,695** | **49.9** | **4,298** |
| ECM 13 | Install High Efficiency Furnaces | No | 0 | 0.0 | 37 | $515 | $28,095 | $2,400 | $25,695 | 49.9 | 4,298 |
| **HVAC System Improvements** | | | **3,987** | **0.0** | **0** | **$610** | **$19,032** | **$0** | **$19,032** | **31.2** | **4,015** |
| ECM 14 | Implement Demand Control Ventilation (DCV) | No | 3,987 | 0.0 | 0 | $610 | $19,032 | $0 | $19,032 | 31.2 | 4,015 |
| **Food Service & Refrigeration Measures** | | | **13,290** | **0.8** | **0** | **$2,033** | **$25,586** | **$0** | **$25,586** | **12.6** | **13,383** |
| ECM 15 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 3,603 | 0.4 | 0 | $551 | $5,156 | $0 | $5,156 | 9.4 | 3,628 |
| ECM 16 | Refrigeration Controls | No | 7,733 | 0.2 | 0 | $1,183 | $19,970 | $0 | $19,970 | 16.9 | 7,787 |
| ECM 17 | Vending Machine Control | Yes | 1,954 | 0.2 | 0 | $299 | $460 | $0 | $460 | 1.5 | 1,968 |
| **TOTALS** | | | **537,670** | **102.4** | **82** | **$83,390** | **$674,631** | **$2,400** | **$672,231** | **8.1** | **550,996** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

*Figure 7 – All Evaluated ECMs*

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **343,671** | **53.9** | **-58** | **$51,758** | **$185,058** | **$0** | **$185,058** | **3.6** | **339,303** |
| ECM 1 | Install LED Fixtures | 116,857 | 9.8 | -11 | $17,726 | $113,526 | $0 | $113,526 | 6.4 | 116,431 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 226,814 | 44.1 | -47 | $34,032 | $71,532 | $0 | $71,532 | 2.1 | 222,872 |
| **Lighting Control Measures** | | **71,053** | **13.8** | **-15** | **$10,660** | **$48,420** | **$0** | **$48,420** | **4.5** | **69,810** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 65,997 | 12.8 | -14 | $9,902 | $42,120 | $0 | $42,120 | 4.3 | 64,843 |
| ECM 4 | Install High/Low Lighting Controls | 5,055 | 1.0 | -1 | $758 | $6,300 | $0 | $6,300 | 8.3 | 4,967 |
| **Variable Frequency Drive (VFD) Measures** | | **68,165** | **15.7** | **118** | **$12,077** | **$77,530** | **$0** | **$77,530** | **6.4** | **82,421** |
| ECM 6 | Install VFDs on Constant Volume (CV) Fans | 41,228 | 13.5 | 0 | $6,306 | $51,536 | $0 | $51,536 | 8.2 | 41,516 |
| ECM 7 | Install VFDs on Chilled Water Pumps | 4,490 | 1.0 | 0 | $687 | $4,076 | $0 | $4,076 | 5.9 | 4,521 |
| ECM 8 | Install VFDs on Heating Water Pumps | 8,997 | 1.1 | 0 | $1,376 | $13,788 | $0 | $13,788 | 10.0 | 9,060 |
| ECM 9 | Install VFDs on Kitchen Hood Fan Motors | 13,450 | 0.1 | 118 | $3,708 | $8,129 | $0 | $8,129 | 2.2 | 27,324 |
| **Food Service & Refrigeration Measures** | | **5,557** | **0.7** | **0** | **$850** | **$5,616** | **$0** | **$5,616** | **6.6** | **5,596** |
| ECM 15 | Refrigerator/Freezer Case Electrically Commutated Motors | 3,603 | 0.4 | 0 | $551 | $5,156 | $0 | $5,156 | 9.4 | 3,628 |
| ECM 17 | Vending Machine Control | 1,954 | 0.2 | 0 | $299 | $460 | $0 | $460 | 1.5 | 1,968 |
| **TOTALS** | | **488,446** | **84.1** | **45** | **$75,346** | **$316,624** | **$0** | **$316,624** | **4.2** | **497,130** |

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

*Figure 8 – Cost Effective ECMs*

## 4.1 Lighting

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **343,671** | **53.9** | **-58** | **$51,758** | **$185,058** | **$0** | **$185,058** | **3.6** | **339,303** |
| ECM 1 | Install LED Fixtures | 116,857 | 9.8 | -11 | $17,726 | $113,526 | $0 | $113,526 | 6.4 | 116,431 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 226,814 | 44.1 | -47 | $34,032 | $71,532 | $0 | $71,532 | 2.1 | 222,872 |

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

### ECM 1: Install LED Fixtures

Replace existing fixtures containing HID lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

**Affected building areas:** gymnasium, auditorium, warehouse, cafeteria, loading dock, and exterior fixtures

### ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

**Affected building areas:** all areas with fluorescent fixtures with T8 tubes and CFLs, auditorium and main lobby with incandescent or halogen lamps

## 4.2 Lighting Controls

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Control Measures** | | **71,053** | **13.8** | **-15** | **$10,660** | **$48,420** | **$0** | **$48,420** | **4.5** | **69,810** |
| ECM 3 | Install Occupancy Sensor Lighting Controls | 65,997 | 12.8 | -14 | $9,902 | $42,120 | $0 | $42,120 | 4.3 | 64,843 |
| ECM 4 | Install High/Low Lighting Controls | 5,055 | 1.0 | -1 | $758 | $6,300 | $0 | $6,300 | 8.3 | 4,967 |

Lighting controls reduce energy use by turning off or lowering lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

### ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

**Affected building areas:** offices, conference rooms, classrooms, gymnasium, library, auditorium, restrooms, and storage rooms

### ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety code requirements for egress. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be taken into account when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

**Affected building areas**: hallways, stairwells

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as an occupant approaches.

## 4.3 Motors

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Motor Upgrades** | | **1,370** | **0.4** | **0** | **$210** | **$10,027** | **$0** | **$10,027** | **47.9** | **1,379** |
| ECM 5 | Premium Efficiency Motors | 1,370 | 0.4 | 0 | $210 | $10,027 | $0 | $10,027 | 47.9 | 1,379 |

### ECM 5: Premium Efficiency Motors

We evaluated replacing standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

**Affected motors:**

| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Additional Motor Description |
|---|---|---|---|---|---|
| Roof | School Kitchen | 1 | Exhaust Fan | 0.5 | EF-24 |
| Roof | Restroom, Locker Rooms, central kitchen | 5 | Exhaust Fan | 0.3 | EF-1 and others |
| Roof | Multiple Locations | 10 | Exhaust Fan | 0.3 | |

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

## 4.4 Variable Frequency Drives (VFD)

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variable Frequency Drive (VFD) Measures** | | **68,165** | **15.7** | **118** | **$12,077** | **$77,530** | **$0** | **$77,530** | **6.4** | **82,421** |
| ECM 6 | Install VFDs on Constant Volume (CV) Fans | 41,228 | 13.5 | 0 | $6,306 | $51,536 | $0 | $51,536 | 8.2 | 41,516 |
| ECM 7 | Install VFDs on Chilled Water Pumps | 4,490 | 1.0 | 0 | $687 | $4,076 | $0 | $4,076 | 5.9 | 4,521 |
| ECM 8 | Install VFDs on Heating Water Pumps | 8,997 | 1.1 | 0 | $1,376 | $13,788 | $0 | $13,788 | 10.0 | 9,060 |
| ECM 9 | Install VFDs on Kitchen Hood Fan Motors | 13,450 | 0.1 | 118 | $3,708 | $8,129 | $0 | $8,129 | 2.2 | 27,324 |

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor

energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

## ECM 6: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one.

Zone thermostats signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature.

VAV system controls should not raise the supply air temperature at the expense of the fan power. A common mistake is to reset the supply air temperature to achieve chiller energy savings, which can lead to additional air flow requirements. Supply air temperature should be kept low (e.g. 55°F) until the minimum fan speed (typically about 50%) is met. At this point, it is efficient to raise the supply air temperature as the load decreases, but not such that additional air flow and thus fan energy is required.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

**Affected air handlers:** Trane GRBA units, Trane TSCB units, Trane WSC units, Trane WCD units

## ECM 7: Install VFDs on Chilled Water Pumps

Install VFDs to control chilled water pumps. Two-way valves must serve the chilled water coils being served and the chilled water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the chilled water distribution they will need to be modified when this measure is implemented. As the chilled water valves close, the differential pressure increases, and the VFD modulates the pump speed to maintain a differential pressure setpoint.

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will need to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

Energy savings result from reducing the pump motor speed (and power) as chilled water valves close. The magnitude of energy savings is based on the estimated amount of time that the system operates at reduced loads.

**Affected pumps**: The chilled water pump

## ECM 8: Install VFDs on Heating Water Pumps

Install variable frequency drives (VFD) to control heating water pumps. Two-way valves must serve the hot water coils and the hot water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the hot water distribution they will need to be modified when this

measure is implemented. As the hot water valves close, the differential pressure increases and the VFD modulates the pump speed to maintain a differential pressure setpoint.

Energy savings result from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

**Affected pumps:** Pumps 3 and 4 & two 1 hp HHW pumps

### ECM 9: Install VFDs on Kitchen Hood Fan Motors

Install a VFD and sensor to control the kitchen hood fan motor. The air flow of the hood is varied based on two key inputs: temperature and smoke/cooking fumes. The VFD controls the amount of exhaust (and kitchen make-up air) based on temperature—the lower the temperature the lower the flow. If the optic sensor is triggered by smoke or cooking fumes, the speed of the fan ramps up to 100%.

Energy savings result from reducing the hood fan speed (and power) when conditions allow for reduced air flow.

## 4.5 Electric Unitary HVAC

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Electric Unitary HVAC Measures** | | **28,531** | **11.5** | **0** | **$4,364** | **$250,632** | **$0** | **$250,632** | **57.4** | **28,730** |
| ECM 10 | Install High Efficiency Air Conditioning Units | 2,384 | 1.4 | 0 | $365 | $17,955 | $0 | $17,955 | 49.2 | 2,401 |
| ECM 11 | Install High Efficiency Heat Pumps | 26,146 | 10.1 | 0 | $3,999 | $232,677 | $0 | $232,677 | 58.2 | 26,329 |

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the split-system AC units or packaged heat pumps are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

### ECM 10: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

**Affected units:** Liebert split AC units

### ECM 11: Install High Efficiency Heat Pumps

Replace standard efficiency heat pumps with high efficiency heat pumps. A higher EER or SEER rating indicates a more efficient cooling system and a higher HSPF rating indicates more efficient heating mode. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average heating and cooling loads, and the estimated annual operating hours.

**Affected units:** Trane air-source packaged and water-source heat pumps

## 4.6 Electric Chillers

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Electric Chiller Replacement** | | **7,604** | **6.4** | **0** | **$1,163** | **$30,251** | **$0** | **$30,251** | **26.0** | **7,657** |
| ECM 12 | Install High Efficiency Chillers | 7,604 | 6.4 | 0 | $1,163 | $30,251 | $0 | $30,251 | 26.0 | 7,657 |

### ECM 12: Install High Efficiency Chillers

We evaluated replacing the older inefficient electric chiller with a new high efficiency chiller. The type of chiller to be installed depends on the magnitude of the cooling load and variability of the cooling load profile, for example:

- Positive displacement chillers are usually under 600 tons of cooling capacity and centrifugal chillers generally start at 150 tons of cooling capacity.
- Constant speed chillers should be used to meet cooling loads with little or no variation while variable speed chillers are more efficient for variable cooling load profiles.
- Water cooled chillers are more efficient than air cooled chillers but require cooling towers and additional pumps to circulate the cooling water.
- In any given size range, variable speed chillers tend to have better partial load efficiency, but worse full load efficiency, than constant speed chillers.

Energy savings result from the improvement in chiller efficiency and matching the right type of chiller to the cooling load. The energy savings are calculated based on the cooling capacity of the new chiller, the improvement in efficiency compared with the base case equipment, the cooling load profile, and the estimated annual operating hours of the chiller before and after the upgrade.

For the purposes of this analysis, we evaluated the replacement of the chiller on a one-for-one basis with equipment of the same capacity. We recommend that you work with your design team to select a chiller that is sized appropriately for the cooling load at this facility. In some cases, the plant energy use can be reduced by selecting multiple chillers that match the facility load profile rather than one or two large chillers. This can also improve the chiller plant reliability through increased redundancy. Energy savings are maximized by proper selection of new equipment based on the cooling load profile.

Replacing the chiller has a long payback based on energy savings and may not be justifiable based simply on energy considerations. However, the chiller is nearing the end of its normal useful life. Typically, the marginal cost of purchasing a high efficiency chiller can be justified by the marginal savings from the improved efficiency. When the chiller is eventually replaced, consider purchasing equipment that exceed the minimum efficiency required by building codes.

## 4.7 Gas-Fired Heating

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Gas Heating (HVAC/Process) Replacement** | | **0** | **0.0** | **37** | **$515** | **$28,095** | **$2,400** | **$25,695** | **49.9** | **4,298** |
| ECM 13 | Install High Efficiency Furnaces | 0 | 0.0 | 37 | $515 | $28,095 | $2,400 | $25,695 | 49.9 | 4,298 |

### ECM 13: Install High Efficiency Furnaces

We evaluated replacing standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that requires proper drainage.

**Affected units:** Trane GRBA and TSCB units

## 4.8 HVAC Improvements

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **HVAC System Improvements** | | **3,987** | **0.0** | **0** | **$610** | **$19,032** | **$0** | **$19,032** | **31.2** | **4,015** |
| ECM 14 | Implement Demand Control Ventilation (DCV) | 3,987 | 0.0 | 0 | $610 | $19,032 | $0 | $19,032 | 31.2 | 4,015 |

### ECM 14: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) monitors the indoor air's carbon dioxide ($CO_2$) content to measure room occupancy. This data is used to regulate the amount of outdoor air provided to the space for ventilation.

Standard ventilation systems often provide outside air based on a space's estimated maximum occupancy but not actual occupancy. During low occupancy periods, the space may then be over ventilated. This wastes energy through heating and cooling the excess outside air flow. DCV reduces unnecessary outdoor air intake by regulating ventilation based on actual occupancy levels. DCV is most suited for facilities where occupancy levels vary significantly from hour to hour and day to day.

Energy savings associated with DCV are based on hours of operation, space occupancy, outside air reduction, and other factors. Energy savings results from eliminating unnecessary ventilation and space conditioning.

**Affected building areas:** gymnasium, cafeteria, auditorium, library

## 4.9 Food Service & Refrigeration Measures

| # | Energy Conservation Measure | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Food Service & Refrigeration Measures** | | **13,290** | **0.8** | **0** | **$2,033** | **$25,586** | **$0** | **$25,586** | **12.6** | **13,383** |
| ECM 15 | Refrigerator/Freezer Case Electrically Commutated Motors | 3,603 | 0.4 | 0 | $551 | $5,156 | $0 | $5,156 | 9.4 | 3,628 |
| ECM 16 | Refrigeration Controls | 7,733 | 0.2 | 0 | $1,183 | $19,970 | $0 | $19,970 | 16.9 | 7,787 |
| ECM 17 | Vending Machine Control | 1,954 | 0.2 | 0 | $299 | $460 | $0 | $460 | 1.5 | 1,968 |

### ECM 15: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in coolers and freezers. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

### ECM 16: Refrigeration Controls

Install additional controls to optimize the operation of walk-in coolers and freezers.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, which reduces annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

### ECM 17: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

# 5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

## Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[5]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

## Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

## Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

## Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save five to ten percent of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

[5] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

## AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

## HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

## Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

## Furnace Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

## Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

## Water Conservation


Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense® ratings for urinals is 0.5 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense® website[6] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

## Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense® products where available.

[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

# 6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

## 6.1 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has **medium potential** for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the medium potential. A PV array located on the roof or over parking spaces may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

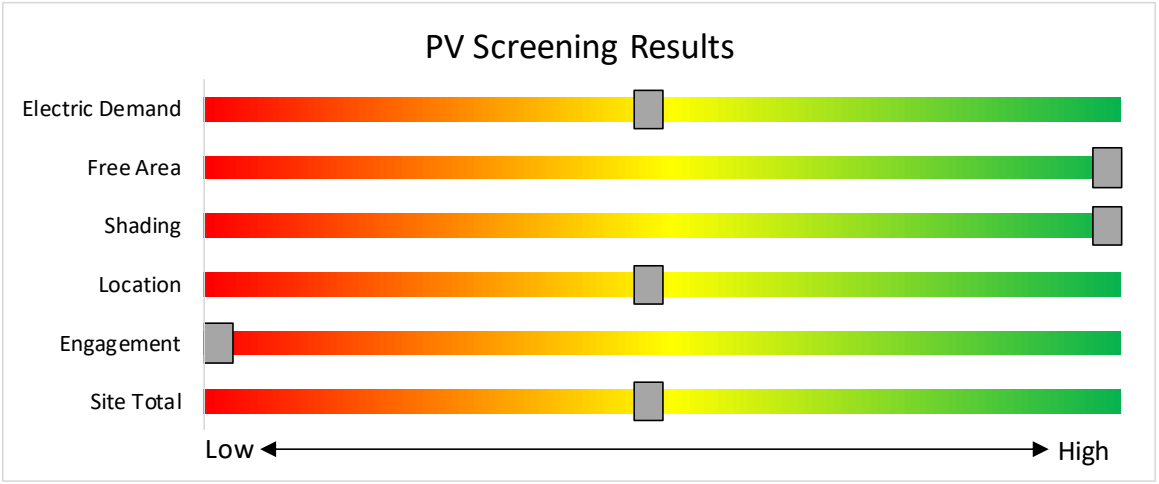



*Figure 9 - Photovoltaic Screening*

**Solar Renewable Energy Certificate (SREC) Registration Program (SRP)**

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar.
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs.
- **Approved Solar Installers in the NJ Market**: www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1.

## 6.2 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

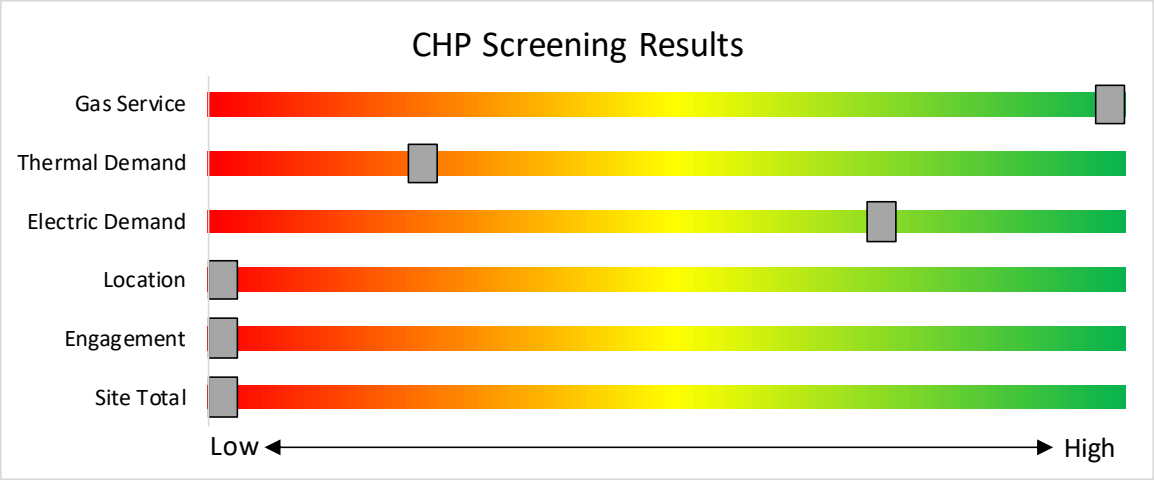
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has **no potential** for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. Low or infrequent thermal load and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.




| | | |
|---|---|---|
| **Potential** | None | |
| **System Type** | None | |
| **System Potential** | 100 | kW |
| **Electric Generation** | 210,308 | kWh/yr |
| **Thermal Generation** | 1,220,001 | MBtu/yr |
| **Displaced Cost** | $16,892 | /yr |
| **Installed Cost** | $360,000 | |

*Figure 10 - Combined Heat and Power Screening*

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

# 7 Project Funding and Incentives

Ready to improve your building's performance? New Jersey's Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available New Jersey Clean Energy Programs.

| | **SmartStart**<br>*Flexibility to install at your own pace* | **Direct Install**<br>*Turnkey installation* | **Pay for Performance**<br>*Whole building upgrades* |
|---|---|---|---|
| **Who should use it?** | Buildings installing individual measures or small group of measures. | Small to mid-size facilities that can bundle multiple measures together.<br>Average peak demand should be below 200 kW.<br>Not suitable for significant building shell issues. | Mid to large size facilities looking to implement as many measures as possible at one time.<br>Peak demand should be over 200 kW. |
| **How does it work?** | Use in-house staff or your preferred contractor. | Pre-approved contractors pass savings along to you via reduced material and labor costs. | Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives. |
| **What are the Incentives?** | Fixed incentives for specific energy efficiency measures. | Incentives pay up to 70% of eligible costs, up to $125,000 per project.<br>You pay the remaining 30% directly to the contractor. | Up to 25% of installation cost, calculated based on level of energy savings per square foot. |
| **How do I participate?** | Submit an application for the specific equipment to be installed. | Contact a participating contractor in your region. | Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets. |
| Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor. | | | |

## 7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely adds, removes, or modifies incentives from year-to-year for various energy efficient equipment based on market trends and new technologies.

**Equipment with Prescriptive Incentives Currently Available:**

*Electric Chillers*
*Electric Unitary HVAC*
*Gas Cooling*
*Gas Heating*
*Gas Water Heating*
*Ground Source Heat Pumps*
*Lighting*
*Lighting Controls*
*Refrigeration Doors*
*Refrigeration Controls*
*Refrigerator/Freezer Motors*
*Food Service Equipment*
*Variable Frequency Drives*

**Incentives**

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are capped at 50% of the total installed incremental project cost, or a project cost buy down to a one-year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

**How to Participate**

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

## 7.2 Direct Install

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives, and controls.

**Incentives**

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Each entity is limited to incentives up to $250,000 per fiscal year.

**How to Participate**

To participate in Direct Install, you will need to contact the participating contractor assigned to the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program, which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

## 7.3 Pay for Performance - Existing Buildings


Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and lighting cannot make up the majority of the savings. P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

The scope of work presented in this audit report does not quite meet the requirements of the current P4P program. However, due to the size of the facility and existing conditions, should additional measures be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process, this facility could potentially meet the requirements necessary to participate in the P4P program.

**Incentives**

Incentives are based on estimated and achieved energy savings ranging from $0.18-$0.22/kWh and $1.80-$2.50/therm, capped at the lesser of 50% total project cost, or $1 million per electric account and $1 million per natural gas account, per fiscal year, not to exceed $2 million per project. An incentive of $0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

**How to Participate**

Contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

## 7.4 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

**Incentives**

| Eligible Technologies | Size (Installed Rated Capacity)[1] | Incentive ($/kW) | % of Total Cost Cap per Project[3] | $ Cap per Project[3] |
|---|---|---|---|---|
| Powered by non-renewable or renewable fuel source[4] | ≤500 kW | $2,000 | 30-40%[2] | $2 million |
| Gas Internal Combustion Engine | >500 kW - 1 MW | $1,000 | | |
| Gas Combustion Turbine | > 1 MW - 3 MW | $550 | 30% | $3 million |
| Microturbine<br>Fuel Cells with Heat Recovery | >3 MW | $350 | | |
| Waste Heat to Power* | <1 MW | $1,000 | 30% | $2 million |
| | > 1MW | $500 | | $3 million |

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

**How to Participate**

You work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

## 7.5 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs described above can also be used to help further reduce the total project cost of eligible measures.

**How to Participate**

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

(1) Use an energy services company or "ESCO."

(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.

(3) Use a hybrid approach of the two options described above where the ESCO is used for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the energy savings plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program description and application can be found at: www.njcleanenergy.com/ESIP.

*ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.*

## 7.6 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey SRECs. SRECs are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SRECs to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

# 8 Energy Purchasing and Procurement Strategies

## 8.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third-party supplier, consider shopping for a reduced rate from third-party electric suppliers. If your facility already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[8].

## 8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third-party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier typically depends on whether a customer prefers budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third-party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[9].

[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] www.state.nj.us/bpu/commercial/shopping.html.

# APPENDIX A: EQUIPMENT INVENTORY & RECOMMENDATIONS

## Lighting Inventory & Recommendations

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Wallpack | 14 | Metal Halide: (1) 100W Lamp | Timeclock | | 128 | 4,380 | 1 | Fixture Replacement | No | 14 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 38 | 4,380 | 0.0 | 5,494 | 0 | $840 | $13,524 | $0 | 16.1 |
| Wallpack | 14 | Compact Fluorescent: (1) 42W Plug-In Lamp | Timeclock | | 42 | 4,380 | 2 | Relamp | No | 14 | LED Lamps: (1) 29W Plug-In Lamp | Timeclock | 29 | 4,380 | 0.0 | 797 | 0 | $122 | $175 | $0 | 1.4 |
| Recessed | 9 | Compact Fluorescent: (2) 13W Plug-In Lamps | Timeclock | | 26 | 4,380 | 2 | Relamp | No | 9 | LED Lamps: (2) 10.5W Plug-In Lamps | Timeclock | 21 | 4,380 | 0.0 | 197 | 0 | $30 | $225 | $0 | 7.5 |
| Wallpack | 14 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | | 35 | 4,380 | | None | No | 14 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 35 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Wallpack | 2 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | | 9 | 4,380 | | None | No | 2 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Timeclock | 9 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Pole | 67 | Metal Halide: (1) 250W Lamp | Timeclock | | 295 | 4,380 | 1 | Fixture Replacement | No | 67 | LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture | Timeclock | 89 | 4,380 | 0.0 | 60,599 | 0 | $9,270 | $80,032 | $0 | 8.6 |
| Pole | 6 | LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture | Timeclock | | 145 | 4,380 | | None | No | 6 | LED - Fixtures: Large Pole/Arm-Mounted Area/Roadway Fixture | Timeclock | 145 | 4,380 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.1 | 494 | 0 | $74 | $146 | $0 | 2.0 |
| Boiler Room | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Central Kitchen Hallway | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $371 | $0 | 3.9 |
| Central Kitchen Hallway | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Director Office | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 830 | 0 | $125 | $489 | $0 | 3.9 |
| Womens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Lunch Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Purchasing Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| File Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.1 | 707 | 0 | $106 | $434 | $0 | 4.1 |
| Reception Area | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 830 | 0 | $125 | $489 | $0 | 3.9 |
| Conference Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 830 | 0 | $125 | $219 | $0 | 1.8 |
| Conference Room | 8 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 8 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.2 | 792 | 0 | $119 | $470 | $0 | 4.0 |
| Resting Area | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |
| Mens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Womens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Common Area | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Mens Locker Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Womens Locker Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $416 | $0 | 4.4 |
| Central Kitchen | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $146 | $0 | 1.5 |
| Central Kitchen | 30 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 30 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 1.4 | 7,067 | -1 | $1,060 | $2,183 | $0 | 2.1 |
| Central Kitchen | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Loading Dock | 6 | Metal Halide: (1) 250W Lamp | Wall Switch | s | 295 | 3,400 | 1 | Fixture Replacement | No | 6 | LED - Fixtures: Downlight Recessed | Wall Switch | 89 | 3,400 | 0.9 | 4,634 | -1 | $695 | $911 | $0 | 1.3 |
| Loading Dock | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Cold Prep Room | 11 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | s | 29 | 3,400 | 3 | None | Yes | 11 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 370 | 0 | $55 | $270 | $0 | 4.9 |
| Cold Prep Room | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Walk-in Unit | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 247 | 0 | $37 | $73 | $0 | 2.0 |
| Warehouse | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $146 | $0 | 1.5 |
| Warehouse | 13 | Metal Halide: (1) 250W Lamp | Wall Switch | s | 295 | 3,400 | 1, 3 | Fixture Replacement | Yes | 13 | LED - Fixtures: Downlight Recessed | Occupancy Sensor | 89 | 2,346 | 2.2 | 11,374 | -2 | $1,706 | $2,243 | $0 | 1.3 |
| Warehouse | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Walk-in Freezer | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 8 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.2 | 987 | 0 | $148 | $292 | $0 | 2.0 |
| Ingredient Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.2 | 942 | 0 | $141 | $489 | $0 | 3.5 |
| Food Bank Cooler | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $416 | $0 | 4.4 |
| Shipping Cooler | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.1 | 494 | 0 | $74 | $146 | $0 | 2.0 |
| Janitorial | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 2,000 | 0.0 | 64 | 0 | $10 | $72 | $0 | 7.6 |
| Cart Wash | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 3,400 | 0.1 | 370 | 0 | $56 | $110 | $0 | 2.0 |
| Cafeteria | 12 | Metal Halide: (1) 150W Lamp | Wall Switch | s | 190 | 3,400 | 1, 3 | Fixture Replacement | Yes | 12 | LED - Fixtures: Downlight Recessed | Occupancy Sensor | 57 | 2,346 | 1.3 | 6,762 | -1 | $1,015 | $2,091 | $0 | 2.1 |
| Cafeteria | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Kitchen | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.3 | 1,413 | 0 | $212 | $329 | $0 | 1.5 |
| School Kitchen | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.4 | 2,120 | 0 | $318 | $763 | $0 | 2.4 |
| School Kitchen | 3 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 3 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Electric Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 4 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.1 | 494 | 0 | $74 | $146 | $0 | 2.0 |
| Electric Room | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 8 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.2 | 987 | 0 | $148 | $292 | $0 | 2.0 |
| School Boiler Room | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Auditorium | 24 | Metal Halide: (1) 250W Lamp | Wall Switch | s | 295 | 3,400 | 1, 3 | Fixture Replacement | Yes | 24 | LED - Fixtures: Downlight Recessed | Occupancy Sensor | 89 | 2,346 | 4.0 | 20,998 | -4 | $3,150 | $4,182 | $0 | 1.3 |
| Auditorium | 14 | Incandescent: Two lamp screw-in | Wall Switch | s | 150 | 3,400 | 2, 3 | Relamp | Yes | 14 | LED Lamps: Two Lamp Screw-in | Occupancy Sensor | 23 | 2,346 | 1.4 | 7,041 | -1 | $1,056 | $752 | $0 | 0.7 |
| Auditorium | 21 | Halogen Incandescent: One lamp flood light | Wall Switch | s | 150 | 3,400 | 2, 3 | Relamp | Yes | 21 | LED Lamps: One lamp flood light | Occupancy Sensor | 23 | 2,346 | 2.0 | 10,562 | -2 | $1,585 | $1,174 | $0 | 0.7 |
| Auditorium | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stage | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.4 | 1,885 | 0 | $283 | $708 | $0 | 2.5 |
| Stage | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Storage | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 2,000 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,380 | 0.2 | 488 | 0 | $73 | $489 | $0 | 6.7 |
| Storage | 3 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 2,000 | 2, 3 | Relamp | Yes | 3 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 1,380 | 0.1 | 175 | 0 | $26 | $75 | $0 | 2.9 |
| Projection Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Gym | 15 | Metal Halide: (1) 250W Lamp | Wall Switch | s | 295 | 3,400 | 1, 3 | Fixture Replacement | Yes | 15 | LED - Fixtures: High-Bay | Occupancy Sensor | 89 | 2,346 | 2.5 | 13,124 | -3 | $1,969 | $11,893 | $0 | 6.0 |
| Gym | 4 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.1 | 396 | 0 | $59 | $370 | $0 | 6.2 |
| Gym | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Storage 1 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Storage 2 | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.2 | 462 | 0 | $69 | $453 | $0 | 6.5 |
| Gym Foyer | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Gym Foyer | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Girls Locker Room | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.4 | 1,885 | 0 | $283 | $708 | $0 | 2.5 |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Boys Locker Room | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.4 | 1,885 | 0 | $283 | $708 | $0 | 2.5 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Art Room | 18 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 18 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 1.0 | 4,980 | -1 | $747 | $1,855 | $0 | 2.5 |
| Art Room | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Room A2 | 21 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 21 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 1.1 | 5,810 | -1 | $872 | $2,074 | $0 | 2.4 |
| Room A2 | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Practice Room 1 | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Practice Room 2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Music Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Maintenance Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.2 | 942 | 0 | $141 | $489 | $0 | 3.5 |
| A Wing Hallway | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 11 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.3 | 1,727 | 0 | $259 | $852 | $0 | 3.3 |
| A Wing Hallway | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Server Closet | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| A Wing Hallway | 9 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 4 | Relamp | Yes | 9 | LED Lamps: (2) 18.5W Plug-In Lamps | High/Low Control | 37 | 2,346 | 0.2 | 891 | 0 | $134 | $675 | $0 | 5.0 |
| Main Lobby | 20 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 20 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.4 | 1,980 | 0 | $297 | $1,040 | $0 | 3.5 |
| Main Lobby | 6 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED Lamps: (4) 18.5W Plug-In Lamps | Occupancy Sensor | 73 | 2,346 | 0.2 | 1,207 | 0 | $181 | $300 | $0 | 1.7 |
| Main Lobby | 9 | Halogen Incandescent: One lamp screw-in | Wall Switch | s | 70 | 3,400 | 2, 3 | Relamp | Yes | 9 | LED Lamps: one lamp screw-in | Occupancy Sensor | 11 | 2,346 | 0.4 | 2,112 | 0 | $317 | $425 | $0 | 1.3 |
| Main Lobby | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Main Entrance | 2 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.0 | 198 | 0 | $30 | $320 | $0 | 10.8 |
| Main Entrance | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Art Foyer | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Art Foyer | 1 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.0 | 99 | 0 | $15 | $25 | $0 | 1.7 |
| Mens Restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Womens Restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |
| Janitorial | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Security Office | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (4) 4' Lamps | Wall Switch | 58 | 3,400 | 0.0 | 209 | 0 | $31 | $73 | $0 | 2.3 |
| Main Office | 9 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 9 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.5 | 2,490 | -1 | $374 | $927 | $0 | 2.5 |
| Assistant Principal | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Conference Room 1 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 1,107 | 0 | $166 | $562 | $0 | 3.4 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Principal | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.2 | 1,178 | 0 | $177 | $544 | $0 | 3.1 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| B wing 1st Floor Hallway | 28 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 28 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.8 | 4,397 | -1 | $660 | $2,147 | $0 | 3.3 |
| B wing 1st Floor Hallway | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 4 | Relamp | Yes | 5 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,346 | 0.1 | 411 | 0 | $62 | $316 | $0 | 5.1 |
| B wing 1st Floor Hallway | 4 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 4 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Closet | 1 | Compact Fluorescent: (1) 13W Plug-In Lamp | Wall Switch | s | 13 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (1) 10.5W Plug-In Lamp | Wall Switch | 11 | 2,000 | 0.0 | 6 | 0 | $1 | $13 | $0 | 15.1 |
| Room B7 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B7 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B6 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B6 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B8 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B8 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B9 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room B9 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Prep Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Room B5 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Room B5 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Closet | 1 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (2) 18.5W Plug-In Lamps | Wall Switch | 37 | 2,000 | 0.0 | 33 | 0 | $5 | $25 | $0 | 5.0 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Room B4 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Room B4 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |
| Closet | 1 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (2) 18.5W Plug-In Lamps | Wall Switch | 37 | 2,000 | 0.0 | 33 | 0 | $5 | $25 | $0 | 5.0 |
| Room B10 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room B10 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B3 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B3 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B2 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B2 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B11 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B11 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Janitorial | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Mechanical Closet | 1 | Compact Fluorescent: (1) 13W Plug-In Lamp | Wall Switch | s | 13 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (1) 10.5W Plug-In Lamp | Wall Switch | 11 | 2,000 | 0.0 | 6 | 0 | $1 | $13 | $0 | 15.1 |
| Room B1 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B1 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Girls Restroom | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.2 | 785 | 0 | $118 | $453 | $0 | 3.8 |
| Boys Restroom | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.2 | 785 | 0 | $118 | $453 | $0 | 3.8 |
| Electric Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 247 | 0 | $37 | $73 | $0 | 2.0 |
| Elevator Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| AV Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Library | 32 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 32 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 1.0 | 5,025 | -1 | $754 | $1,708 | $0 | 2.3 |
| Library | 32 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 32 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 1.5 | 7,538 | -2 | $1,131 | $2,293 | $0 | 2.0 |
| Library | 10 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 3 | Relamp | Yes | 10 | LED Lamps: (4) 18.5W Plug-In Lamps | Occupancy Sensor | 73 | 2,346 | 0.4 | 2,011 | 0 | $302 | $770 | $0 | 2.6 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Library | 8 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 8 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.2 | 792 | 0 | $119 | $470 | $0 | 4.0 |
| Library | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Library | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 277 | 0 | $42 | $73 | $0 | 1.8 |
| Library Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Work Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Room C106 | 20 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 20 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.9 | 4,711 | -1 | $707 | $1,635 | $0 | 2.3 |
| Room C106 | 7 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 7 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 576 | 0 | $86 | $128 | $0 | 1.5 |
| Room C106 | 2 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 2 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Server Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Room B107 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room B107 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Server Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Team Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Womens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Mens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Office | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| C wing Hallway | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 15 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.5 | 2,356 | 0 | $353 | $1,223 | $0 | 3.5 |
| C wing Hallway | 7 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 7 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Girls Restroom | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.2 | 785 | 0 | $118 | $453 | $0 | 3.8 |
| Boys Restroom | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.2 | 785 | 0 | $118 | $453 | $0 | 3.8 |
| C wing Hallway | 1 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 4 | Relamp | Yes | 1 | LED Lamps: (2) 18.5W Plug-In Lamps | High/Low Control | 37 | 2,346 | 0.0 | 99 | 0 | $15 | $25 | $0 | 1.7 |
| C wing Hallway | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $298 | $0 | 6.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Conference Room 2 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 830 | 0 | $125 | $489 | $0 | 3.9 |
| Storage | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 277 | 0 | $42 | $380 | $0 | 9.1 |
| Electric Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Conference Room 3 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| CST Room | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,383 | 0 | $208 | $635 | $0 | 3.1 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Office 1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 3 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Nurses Office | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Nurses Office | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Office 1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 1 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Exam Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Lunch Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 185 | 0 | $28 | $343 | $0 | 12.4 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Room C1 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 165 | 0 | $25 | $37 | $0 | 1.5 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| OP/TP Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 1,107 | 0 | $166 | $562 | $0 | 3.4 |
| Time out Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Room C2 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 1,107 | 0 | $166 | $562 | $0 | 3.4 |
| Room C3 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C3 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 165 | 0 | $25 | $37 | $0 | 1.5 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Room C6 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room C6 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Room C5 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room C5 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room C5 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room C4 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room C4 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room C4 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Stairwell 4 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $335 | $0 | 4.7 |
| Stairwell 4 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Stairwell 4 | 1 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 4 | Relamp | Yes | 1 | LED Lamps: (4) 18.5W Plug-In Lamps | High/Low Control | 73 | 2,346 | 0.0 | 201 | 0 | $30 | $50 | $0 | 1.7 |
| Closet | 1 | Compact Fluorescent: (1) 13W Plug-In Lamp | Wall Switch | s | 13 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (1) 10.5W Plug-In Lamp | Wall Switch | 11 | 2,000 | 0.0 | 6 | 0 | $1 | $13 | $0 | 15.1 |
| Room C26 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C26 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| C wing 2nd Floor Hallway | 13 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 13 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.4 | 2,042 | 0 | $306 | $1,150 | $0 | 3.8 |
| C wing 2nd Floor Hallway | 5 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 5 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| C wing 2nd Floor Hallway | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 4 | Relamp | Yes | 5 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,346 | 0.1 | 411 | 0 | $62 | $91 | $0 | 1.5 |
| Room C27 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room C27 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room C25 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Room C25 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Room C24 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 1,107 | 0 | $166 | $562 | $0 | 3.4 |
| Room C24 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |
| Room C28 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room C28 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room C28 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $325 | $0 | 8.8 |
| Prep Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Room C27 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $325 | $0 | 8.8 |
| Room C23 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C23 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room C22 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C22 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room C29 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C29 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room C29 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Storage | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,380 | 0.1 | 277 | 0 | $42 | $380 | $0 | 9.1 |
| Electric Room | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Closet | 1 | Compact Fluorescent: (1) 13W Plug-In Lamp | Wall Switch | s | 13 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (1) 10.5W Plug-In Lamp | Wall Switch | 11 | 2,000 | 0.0 | 6 | 0 | $1 | $13 | $0 | 15.1 |
| Room C21 | 12 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 12 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,320 | -1 | $498 | $1,146 | $0 | 2.3 |
| Room C21 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Girls Restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |
| Boys Restroom | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |
| Janitorial | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Stairwell 3 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $335 | $0 | 4.7 |
| Stairwell 3 | 1 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 4 | Relamp | Yes | 1 | LED Lamps: (4) 18.5W Plug-In Lamps | High/Low Control | 73 | 2,346 | 0.0 | 201 | 0 | $30 | $50 | $0 | 1.7 |
| Stairwell 3 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| B wing 2nd Floor Hallway | 2 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 4 | Relamp | Yes | 2 | LED Lamps: (2) 18.5W Plug-In Lamps | High/Low Control | 37 | 2,346 | 0.0 | 198 | 0 | $30 | $50 | $0 | 1.7 |
| B wing 2nd Floor Hallway | 23 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 23 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.7 | 3,612 | -1 | $542 | $1,740 | $0 | 3.2 |
| B wing 2nd Floor Hallway | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 4 | Relamp | Yes | 5 | LED - Linear Tubes: (4) 4' Lamps | High/Low Control | 58 | 2,346 | 0.3 | 1,383 | 0 | $208 | $590 | $0 | 2.8 |
| Womens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Mens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Team Room | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Guidence Office 1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Guidence Office 2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Conference Room | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.2 | 830 | 0 | $125 | $219 | $0 | 1.8 |
| Conference Room | 8 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 8 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.2 | 792 | 0 | $119 | $470 | $0 | 4.0 |
| Student Office | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 277 | 0 | $42 | $73 | $0 | 1.8 |
| Student Office | 5 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 3,400 | 2, 3 | Relamp | Yes | 5 | LED Lamps: (2) 18.5W Plug-In Lamps | Occupancy Sensor | 37 | 2,346 | 0.1 | 495 | 0 | $74 | $395 | $0 | 5.3 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Office 1 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 2 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 3 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 4 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Office 4 Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Office 5 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Closet | 1 | Compact Fluorescent: (2) 26W Plug-In Lamps | Wall Switch | s | 52 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (2) 18.5W Plug-In Lamps | Wall Switch | 37 | 2,000 | 0.0 | 33 | 0 | $5 | $25 | $0 | 5.0 |
| Office 6 | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.1 | 553 | 0 | $83 | $416 | $0 | 5.0 |
| Mechanical Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 247 | 0 | $37 | $73 | $0 | 2.0 |
| Copy Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | s | 93 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 2,346 | 0.1 | 471 | 0 | $71 | $380 | $0 | 5.4 |
| Room B206 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room B206 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 494 | 0 | $74 | $380 | $0 | 5.1 |
| Server Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Storage | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 2,000 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 1,380 | 0.1 | 326 | 0 | $49 | $416 | $0 | 8.5 |
| Room B202 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Mens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Womens Restroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 123 | 0 | $19 | $37 | $0 | 2.0 |
| Stairwell 1 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $335 | $0 | 4.7 |
| Stairwell 1 | 1 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 4 | Relamp | Yes | 1 | LED Lamps: (4) 18.5W Plug-In Lamps | High/Low Control | 73 | 2,346 | 0.0 | 201 | 0 | $30 | $50 | $0 | 1.7 |
| Stairwell 1 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Electric Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2 | Relamp | No | 2 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 3,400 | 0.0 | 247 | 0 | $37 | $73 | $0 | 2.0 |
| Janitorial | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Boys Restroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $416 | $0 | 4.4 |
| Girls Restroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 628 | 0 | $94 | $416 | $0 | 4.4 |
| Room B21 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room B21 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Closet | 1 | Compact Fluorescent: (1) 13W Plug-In Lamp | Wall Switch | s | 13 | 2,000 | 2 | Relamp | No | 1 | LED Lamps: (1) 10.5W Plug-In Lamp | Wall Switch | 11 | 2,000 | 0.0 | 6 | 0 | $1 | $13 | $0 | 15.1 |
| Room B22 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room B22 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B22 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B31 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Room B31 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B31 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B30 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room B30 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B30 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $325 | $0 | 8.8 |
| Room B23 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room B23 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B23 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| B wing 2nd Floor Hallway | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 4 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | High/Low Control | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $298 | $0 | 6.0 |
| Room B24 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Room B24 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |
| Storage | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 2,000 | 2 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,000 | 0.0 | 73 | 0 | $11 | $37 | $0 | 3.4 |
| Room B25 | 6 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 6 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.3 | 1,660 | 0 | $249 | $708 | $0 | 2.8 |
| Room B25 | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.1 | 329 | 0 | $49 | $73 | $0 | 1.5 |
| Room B29 | 15 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 15 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.8 | 4,150 | -1 | $623 | $1,365 | $0 | 2.2 |
| Room B29 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B29 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $325 | $0 | 8.8 |
| Prep Room | 2 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 3 | Relamp | Yes | 2 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 2,346 | 0.1 | 314 | 0 | $47 | $343 | $0 | 7.3 |
| Room B26 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room B26 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B26 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B27 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |
| Room B27 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B27 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Room B28 | 11 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | s | 114 | 3,400 | 2, 3 | Relamp | Yes | 11 | LED - Linear Tubes: (4) 4' Lamps | Occupancy Sensor | 58 | 2,346 | 0.6 | 3,044 | -1 | $457 | $1,073 | $0 | 2.4 |

| | Existing Conditions | | | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Light Level | Watts per Fixture | Annual Operating Hours | ECM # | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Room B28 | 1 | Compact Fluorescent: (3) 32W Plug-In Lamp | Wall Switch | s | 96 | 3,400 | 2, 3 | Relamp | Yes | 1 | LED Lamps: (3) 23W Biax Lamps | Occupancy Sensor | 67 | 2,346 | 0.0 | 186 | 0 | $28 | $38 | $0 | 1.3 |
| Room B28 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | s | 32 | 3,400 | 2, 3 | Relamp | Yes | 3 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 2,346 | 0.0 | 247 | 0 | $37 | $55 | $0 | 1.5 |
| Stairwell 2 | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | s | 62 | 3,400 | 2, 4 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | High/Low Control | 29 | 2,346 | 0.1 | 471 | 0 | $71 | $335 | $0 | 4.7 |
| Stairwell 2 | 1 | Compact Fluorescent: (4) 26W Plug-In Lamps | Wall Switch | s | 104 | 3,400 | 2, 4 | Relamp | Yes | 1 | LED Lamps: (4) 18.5W Plug-In Lamps | High/Low Control | 73 | 2,346 | 0.0 | 201 | 0 | $30 | $50 | $0 | 1.7 |
| Stairwell 2 | 1 | Exit Signs: LED - 2 W Lamp | None | | 6 | 8,760 | | None | No | 1 | Exit Signs: LED - 2 W Lamp | None | 6 | 8,760 | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Kitchen | 1 | Supply Fan | 7.5 | 91.7% | No | w | 2,700 | 6 | No | 91.7% | Yes | 1 | 2.1 | 6,178 | 0 | $945 | $4,761 | $0 | 5.0 |
| Roof | Kitchen (RTU-K1) | 1 | Supply Fan | 10.0 | 89.5% | No | w | 2,700 | 6 | No | 91.7% | Yes | 1 | 3.0 | 8,804 | 0 | $1,347 | $5,152 | $0 | 3.8 |
| Roof | Main Lobby, Cafeteria, Music Room, Gym, Library | 7 | Supply Fan | 2.0 | 84.0% | No | w | 2,700 | 6 | No | 86.5% | Yes | 7 | 4.2 | 13,244 | 0 | $2,026 | $22,827 | $0 | 11.3 |
| Roof | Auditorium | 2 | Supply Fan | 3.0 | 86.5% | No | w | 2,700 | 6 | No | 89.5% | Yes | 2 | 1.8 | 5,555 | 0 | $850 | $7,768 | $0 | 9.1 |
| Roof | Stage, School Kitchen | 2 | Supply Fan | 3.0 | 86.5% | No | w | 2,700 | 6 | No | 89.5% | Yes | 2 | 1.8 | 5,555 | 0 | $850 | $7,768 | $0 | 9.1 |
| Roof | School Kitchen | 1 | Kitchen Hood Exhaust Fan | 1.5 | 84.0% | No | w | 2,700 | 9 | No | 86.5% | Yes | 1 | 0.0 | 2,775 | 39 | $975 | $3,391 | $0 | 3.5 |
| Roof | School Kitchen | 1 | Supply Fan | 2.0 | 84.0% | No | w | 2,700 | 6 | No | 86.5% | Yes | 1 | 0.6 | 1,892 | 0 | $289 | $3,261 | $0 | 11.3 |
| Roof | School Kitchen | 1 | Exhaust Fan | 0.5 | 75.0% | No | w | 2,700 | 5 | Yes | 78.2% | No | | 0.0 | 41 | 0 | $6 | $352 | $0 | 55.9 |
| Roof | Restroom, Locker Rooms, central kitchen | 5 | Exhaust Fan | 0.3 | 65.0% | No | w | 2,700 | 5 | Yes | 73.4% | No | | 0.1 | 443 | 0 | $68 | $3,225 | $0 | 47.6 |
| Roof | Kitchen | 1 | Kitchen Hood Exhaust Fan | 7.5 | 88.5% | No | w | 2,700 | 9 | No | 91.0% | Yes | 1 | 0.1 | 10,676 | 78 | $2,733 | $4,738 | $0 | 1.7 |
| Boiler Room | Glycol Pump | 1 | Process Pump | 3.0 | 82.5% | No | w | 2,700 | | No | 82.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Steam Boiler | 1 | Combustion Air Fan | 0.8 | 72.0% | No | w | 150 | | No | 72.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Air Compressor | 1 | Air Compressor | 7.5 | 84.0% | No | w | 500 | | No | 84.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Boiler Room | Chilled Water | 1 | Chilled Water Pump | 5.0 | 87.5% | No | w | 2,700 | 7 | No | 89.5% | Yes | 1 | 1.0 | 4,490 | 0 | $687 | $4,076 | $0 | 5.9 |
| Boiler Room | School | 1 | Supply Fan | 0.5 | 75.0% | No | w | 350 | | No | 75.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Central Kitchen | Kettles | 2 | Other | 3.0 | 87.5% | No | w | 1,000 | | No | 87.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | School DHW Boiler | 2 | Combustion Air Fan | 0.3 | 55.0% | No | w | 150 | | No | 55.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | school HHW | 2 | Heating Hot Water Pump | 3.0 | 78.5% | No | w | 2,700 | 8 | No | 89.5% | Yes | 2 | 0.9 | 7,050 | 0 | $1,078 | $7,768 | $0 | 7.2 |
| School Boiler Room | school HHW | 2 | Heating Hot Water Pump | 50.0 | 94.5% | Yes | w | 2,700 | | No | 94.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | school HHW | 2 | Heating Hot Water Pump | 1.0 | 82.5% | No | w | 2,700 | 8 | No | 85.5% | Yes | 2 | 0.2 | 1,947 | 0 | $298 | $6,020 | $0 | 20.2 |

| | | Existing Conditions | | | | | | | Proposed Conditions | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Remaining Useful Life | Annual Operating Hours | ECM # | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Elevator Room | Elevator | 1 | Other | 25.0 | 75.5% | No | w | 330 | | No | 75.5% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Roof | Multiple Locations | 10 | Exhaust Fan | 0.3 | 65.0% | No | w | 2,700 | 5 | Yes | 73.4% | No | | 0.2 | 886 | 0 | $135 | $6,450 | $0 | 47.6 |
| School | Various Spaces | 88 | Supply Fan | 0.1 | 71.0% | No | w | 2,700 | | No | 71.0% | No | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Electric HVAC Inventory & Recommendations

### Electric Chiller Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Chiller Quantity | System Type | Cooling Capacity per Unit (Tons) | Remaining Useful Life | ECM # | Install High Efficiency Chillers? | Chiller Quantity | System Type | Constant/ Variable Speed | Cooling Capacity (Tons) | Full Load Efficiency (kW/Ton) | IPLV Efficiency (kW/Ton) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Outside Mechanical Area | Central Kitchen | 1 | Air-Cooled Scroll Chiller | 22.00 | w | 12 | Yes | 1 | Air-Cooled Scroll Chiller | Variable | 22.00 | 1.24 | 0.74 | 6.4 | 7,604 | 0 | $1,163 | $30,251 | $0 | 26.0 |

### Fuel Heating Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Remaining Useful Life | ECM # | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Kitchen | 1 | Furnace | 480.00 | w | 13 | Yes | 1 | Furnace | 480.00 | 95.00% | AFUE | 0.0 | 0 | 14 | $199 | $10,876 | $800 | 50.6 |
| Roof | Kitchen (RTU-K1) | 1 | Furnace | 560.00 | w | 13 | Yes | 1 | Furnace | 560.00 | 95.00% | AFUE | 0.0 | 0 | 17 | $233 | $12,688 | $800 | 51.1 |
| Roof | School Kitchen | 1 | Furnace | 200.00 | w | 13 | Yes | 1 | Furnace | 200.00 | 95.00% | AFUE | 0.0 | 0 | 6 | $83 | $4,531 | $800 | 44.9 |
| Boiler Room | Central Kitchen | 1 | Forced Draft Steam Boiler | ###### | w | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | School Heating | 2 | Condensing Hot Water Boiler | ###### | w | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

### Demand Control Ventilation Recommendations

| | | Recommendation Inputs | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Affected | ECM # | Number of Zones | Cooling Capacity of Controlled System (Tons) | Electric Heating Capacity of Controlled System (kBtu/hr) | Output Heating Capacity of Controlled System (MBh) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Roof | Gym | 14 | 4.00 | 20.00 | 216.00 | | 0.0 | 976 | 0 | $149 | $5,438 | $0 | 36.4 |
| Roof | Auditorium | 14 | 4.00 | 30.00 | 332.00 | | 0.0 | 1,548 | 0 | $237 | $5,438 | $0 | 23.0 |
| Roof | Cafeteria | 14 | 4.00 | 20.00 | 216.00 | | 0.0 | 976 | 0 | $149 | $5,438 | $0 | 36.4 |
| Roof | Library | 14 | 2.00 | 10.00 | 108.00 | | 0.0 | 488 | 0 | $75 | $2,719 | $0 | 36.4 |

## DHW Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Remaining Useful Life | ECM # | Replace? | System Quantity | System Type | Fuel Type | System Efficiency | Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler Room | Central Kitchen | 1 | Boiler | w | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Boiler Room | School DHW | 2 | Boiler | w | | No | | | | | | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

**Walk-In Cooler/Freezer Inventory & Recommendations**

| | Existing Conditions | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Cooler/ Freezer Quantity | Case Type/Temperature | ECM # | Install EC Evaporator Fan Motors? | Install Electric Defrost Control? | Install Evaporator Fan Control? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| School Kitchen | 1 | Cooler (35F to 55F) | 15, 16 | Yes | No | Yes | 0.1 | 1,250 | 0 | $191 | $2,281 | $0 | 11.9 |
| School Kitchen | 1 | Low Temp Freezer (-35F to -5F) | 15, 16 | Yes | Yes | Yes | 0.1 | 2,002 | 0 | $306 | $2,799 | $0 | 9.1 |
| Work Cooler | 1 | Cooler (35F to 55F) | 15, 16 | Yes | No | Yes | 0.1 | 1,024 | 0 | $157 | $2,281 | $0 | 14.6 |
| Work Cooler | 1 | Cooler (35F to 55F) | 15, 16 | Yes | Yes | Yes | 0.1 | 1,837 | 0 | $281 | $2,799 | $0 | 10.0 |
| Refrigerated Storage | 2 | Cooler (35F to 55F) | 15, 16 | Yes | No | Yes | 0.1 | 1,461 | 0 | $224 | $4,258 | $0 | 19.0 |
| Shipping Cooler | 2 | Cooler (35F to 55F) | 15, 16 | Yes | No | Yes | 0.1 | 1,003 | 0 | $153 | $3,955 | $0 | 25.8 |
| Warehouse Freezer | 1 | Low Temp Freezer (-35F to -5F) | 15, 16 | Yes | Yes | Yes | 0.1 | 1,755 | 0 | $268 | $2,799 | $0 | 10.4 |
| Food Bank Cooler | 2 | Cooler (35F to 55F) | 15, 16 | Yes | No | Yes | 0.1 | 1,003 | 0 | $153 | $3,955 | $0 | 25.8 |

## Commercial Refrigerator/Freezer Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | ENERGY STAR Qualified? | ECM # | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| School Kitchen | 3 | Refrigerator Chest | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Kitchen | 1 | Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Commercial Ice Maker Inventory & Recommendations

## Cooking Equipment Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | High Efficiency Equipement? | ECM # | Install High Efficiency Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Central Kitchen | 1 | Gas Combination Oven/Steam Cooker (>28 Pans) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| Central Kitchen | 2 | Insulated Food Holding Cabinet (Full Size) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Kitchen | 1 | Insulated Food Holding Cabinet (Full Size) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Kitchen | 1 | Gas Rack Oven (Single) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |
| School Kitchen | 1 | Gas Convection Oven (Full Size) | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Dishwasher Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Dishwasher Type | Water Heater Fuel Type | Booster Heater Fuel Type | ENERGY STAR Qualified? | ECM # | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Payback w/ Incentives in Years |
| Central Kitchen | 1 | Single Tank Conveyor (High Temp) | Electric | Electric | Yes | | No | 0.0 | 0 | 0 | $0 | $0 | $0 | 0.0 |

## Plug Load Inventory

| | Existing Conditions | | | |
|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Multiple Locations | 50 | Desktops | 75.0 | |
| Multiple Locations | 15 | Printers | 20.0 | |
| Multiple Locations | 450 | Laptops | 40.0 | |
| Multiple Locations | 9 | Refrigerator | 600.0 | |
| Multiple Locations | 11 | Microwave | 1,000.0 | |
| Multiple Locations | 4 | Washer/Dryer | 2,500.0 | |
| Multiple Locations | 11 | Coffee Machine | 400.0 | |
| Multiple Locations | 12 | Minifridge | 30.0 | |
| Art Room | 1 | Kiln | 11,000.0 | |
| Multiple Locations | 25 | TV | 120.0 | |
| Multiple Locations | 7 | Dehumidifier | 1,500.0 | |
| Multiple Locations | 24 | Water Cooler | 500.0 | |
| Kitchen | 1 | Electric Stove | 3,000.0 | |

## Vending Machine Inventory & Recommendations

| | Existing Conditions | | Proposed Conditions | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Vending Machine Type | ECM # | Install Controls? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Team Room | 1 | Refrigerated | 17 | Yes | 0.2 | 1,612 | 0 | $247 | $230 | $0 | 0.9 |
| Team Room | 1 | Non-Refrigerated | 17 | Yes | 0.0 | 343 | 0 | $52 | $230 | $0 | 4.4 |

# APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

EUI is presented in terms of *site energy* and *source energy*. Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

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## ENERGY STAR® Statement of Energy Performance

**24**

ENERGY STAR® Score[1]

### Thomas Wallace Middle School

**Primary Property Type:** K-12 School
**Gross Floor Area (ft²):** 119,380
**Built:** 2006

**For Year Ending:** June 30, 2018
**Date Generated:** September 30, 2019

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

#### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Thomas Wallace Middle School<br>688 N. Mill Road<br>Vineland, New Jersey 08360 | Vineland Public Schools<br>61 W. Landis Avenue<br>Vineland, NJ 08360<br>856-794-6700, ext 2226 | Gene Mercoli<br>61 W. Landis Avenue<br>Vineland, NJ 08360<br>856-794-6700, ext. 2226<br>jrosado@trcsolutions.com |

**Property ID:** 7566449

#### Energy Consumption and Energy Use Intensity (EUI)

**Site EUI**
58.6 kBtu/ft²

**Source EUI**
142.5 kBtu/ft²

| Annual Energy by Fuel | | |
|---|---|---|
| Electric - Grid (kBtu) | 5,525,355 (79%) | |
| Natural Gas (kBtu) | 1,464,378 (21%) | |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 45.2 |
| National Median Source EUI (kBtu/ft²) | 109.9 |
| % Diff from National Median Source EUI | 30% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 638 |

### Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

**Licensed Professional**

___ _____
.
(___)___-_____
_____

**Professional Engineer Stamp (if applicable)**

# APPENDIX C: GLOSSARY

| TERM | DEFINITION |
|---|---|
| **Blended Rate** | Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour. |
| **Btu** | *British thermal unit*: a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit. |
| **CHP** | *Combined heat and power*. Also referred to as cogeneration. |
| **COP** | *Coefficient of performance*: a measure of efficiency in terms of useful energy delivered divided by total energy input. |
| **Demand Response** | Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives. |
| **DCV** | *Demand control ventilation*: a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need. |
| **US DOE** | *United States Department of Energy* |
| **EC Motor** | *Electronically commutated motor* |
| **ECM** | *Energy conservation measure* |
| **EER** | *Energy efficiency ratio*: a measure of efficiency in terms of cooling energy provided divided by electric input. |
| **EUI** | *Energy Use Intensity:* measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance. |
| **Energy Efficiency** | Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service. |
| **ENERGY STAR®** | ENERGY STAR® is the government-backed symbol for energy efficiency. The ENERGY STAR® program is managed by the EPA. |
| **EPA** | *United States Environmental Protection Agency* |
| **Generation** | The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil). |
| **GHG** | *Greenhouse gases:* gases that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface. |
| **gpf** | *Gallons per flush* |

| | |
|---|---|
| **gpm** | *Gallon per minute* |
| **HID** | *High intensity discharge:* high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor. |
| **hp** | *Horsepower* |
| **HPS** | *High-pressure sodium*: a type of HID lamp |
| **HSPF** | *Heating seasonal performance factor:* a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input. |
| **HVAC** | *Heating, ventilating, and air conditioning* |
| **IHP 2014** | US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency. |
| **IPLV** | *Integrated part load value:* a measure of the part load efficiency usually applied to chillers. |
| **kBtu** | One thousand British thermal units |
| **kW** | *Kilowatt*: equal to 1,000 Watts. |
| **kWh** | *Kilowatt-hour*: 1,000 Watts of power expended over one hour. |
| **LED** | *Light emitting diode*: a high-efficiency source of light with a long lamp life. |
| **LGEA** | *Local Government Energy Audit* |
| **Load** | The total power a building or system is using at any given time. |
| **Measure** | A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption. |
| **MH** | *Metal halide*: a type of HID lamp |
| **MBh** | *Thousand Btu per hour* |
| **MBtu** | *One thousand British thermal units* |
| **MMBtu** | *One million British thermal units* |
| **MV** | *Mercury Vapor:* a type of HID lamp |
| **NJBPU** | *New Jersey Board of Public Utilities* |
| **NJCEP** | *New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money and the environment. |
| **psig** | Pounds per square inch gauge |
| **Plug Load** | Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug. |
| **PV** | *Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current). |

| | |
|---|---|
| **SEER** | *Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input. |
| **SEP** | *Statement of energy performance:* a summary document from the ENERGY STAR® Portfolio Manager®. |
| **Simple Payback** | The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings. |
| **SREC** | *Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array. |
| **T5, T8, T12** | A reference to a linear lamp diameter. The number represents increments of 1/8$^{th}$ of an inch. |
| **Temperature Setpoint** | The temperature at which a temperature regulating device (thermostat, for example) has been set. |
| **therm** | 100,000 Btu. Typically used as a measure of natural gas consumption. |
| **tons** | A unit of cooling capacity equal to 12,000 Btu/hr. |
| **Turnkey** | Provision of a complete product or service that is ready for immediate use |
| **VAV** | *Variable air volume* |
| **VFD** | *Variable frequency drive*: a controller used to vary the speed of an electric motor. |
| **WaterSense®** | The symbol for water efficiency. The WaterSense® program is managed by the EPA. |
| **Watt (W)** | Unit of power commonly used to measure electricity use. |