Local Government Energy Audit Report

Washington Township High School

September 4, 2024

Prepared for:
Washington Township BOE
509 & 529 Hurffville-Cross Keys Rd
Sewell, New Jersey 08080

Prepared by:
TRC
317 George Street
New Brunswick, New Jersey 08901

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities and help prioritize specific measures for implementation. 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 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 material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on selected products and installers. TRC and NJBPU do not guarantee cost estimates and shall in no event be held liable should actual installed costs vary from these material and labor estimates.

Incentive values provided in this report are estimated based on previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

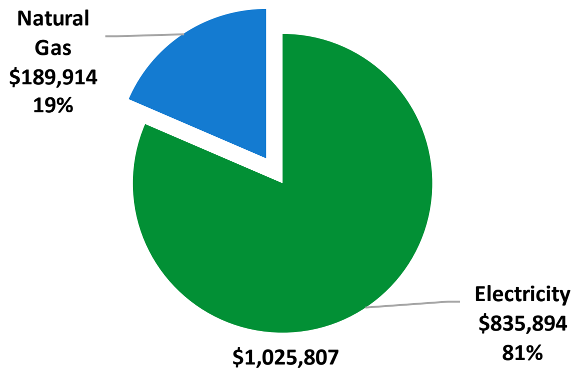
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

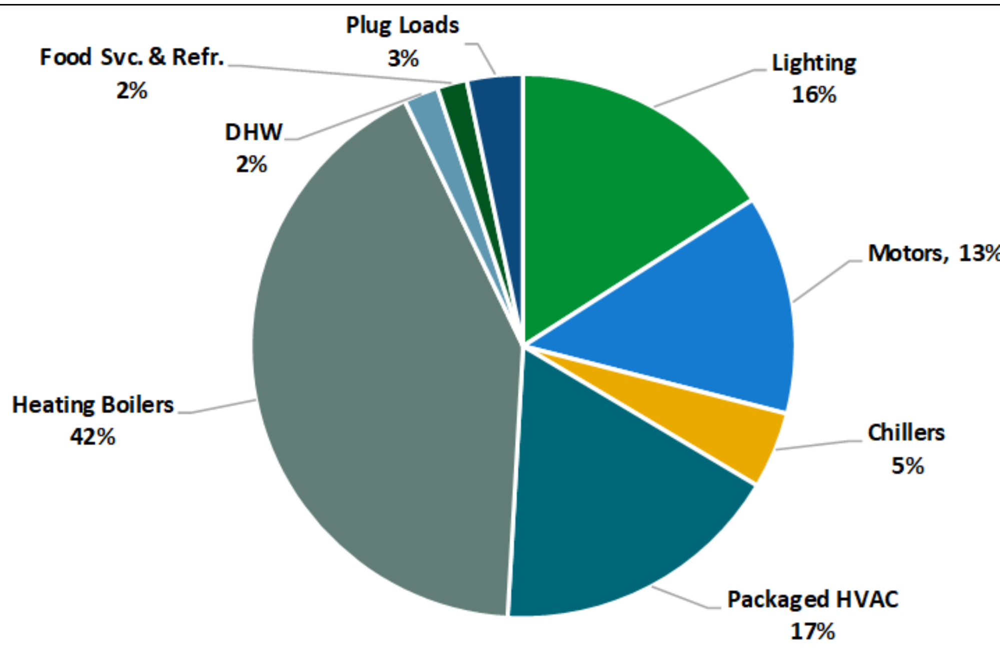
Table of Contents

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Washington Township High 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 Energy Utilities	Costs: $1,025,807 Electricity: 5,005,083 kWh Natural Gas: 140,780 Therms Water: 2,809,424 Gallons	
ENERGY STAR® Benchmarking Score	38 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.



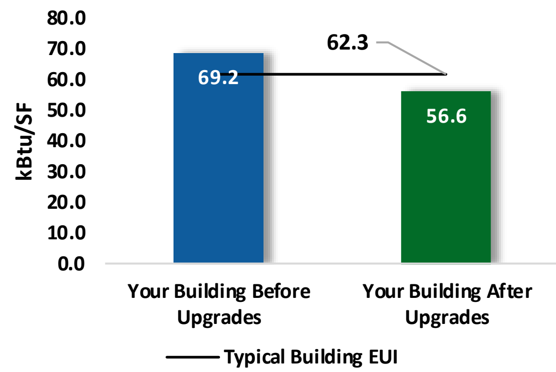
Energy Use by System

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.

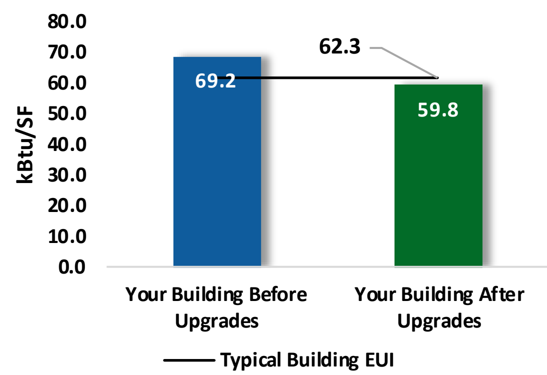
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$2,470,480
Potential Rebates & Incentives[1]	$206,250
Annual Cost Savings	$231,811
Annual Energy Savings	Electricity: 1,285,288 kWh Natural Gas: 12,718 Therms
Greenhouse Gas Emission Savings	722 Tons
Simple Payback	9.8 Years
Site Energy Savings (All Utilities)	18%



Scenario 2: Cost Effective Package[2]

Installation Cost	$1,185,680
Potential Rebates & Incentives	$152,050
Annual Cost Savings	$204,589
Annual Energy Savings	Electricity: 1,217,736 kWh Natural Gas: 902 Therms
Greenhouse Gas Emission Savings	618 Tons
Simple Payback	5.1 Years
Site Energy Savings (all utilities)	14%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that 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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**769,763**	**191.1**	**-136**	**$126,718**	**$559,860**	**$88,370**	**$471,490**	**3.7**	**759,180**
ECM 1	Install LED Fixtures	Yes	158,873	39.6	-9	$26,409	$218,220	$16,670	$201,550	7.6	158,903
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	2,029	0.5	0	$333	$1,390	$130	$1,260	3.8	1,994
ECM 3	Retrofit Fixtures with LED Lamps	Yes	608,861	150.9	-127	$99,976	$340,250	$71,570	$268,680	2.7	598,284
Lighting Control Measures			**93,618**	**21.1**	**-20**	**$15,371**	**$82,500**	**$35,530**	**$46,970**	**3.1**	**91,980**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	41,947	11.4	-9	$6,887	$37,410	$4,260	$33,150	4.8	41,214
ECM 5	Install High/Low Lighting Controls	Yes	51,670	9.6	-11	$8,484	$45,090	$31,270	$13,820	1.6	50,766
Variable Frequency Drive (VFD) Measures			**79,690**	**27.0**	**12**	**$13,477**	**$101,400**	**$10,500**	**$90,900**	**6.7**	**81,703**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	57,607	20.9	0	$9,621	$79,600	$8,800	$70,800	7.4	58,010
ECM 7	Install VFDs on Chilled Water Pumps	Yes	19,539	6.0	0	$3,263	$16,700	$1,500	$15,200	4.7	19,675
ECM 8	Install VFDs on Kitchen Hood Fan Motors	Yes	2,544	0.1	12	$593	$5,100	$200	$4,900	8.3	4,018
Unitary HVAC Measures			**348,063**	**304.7**	**0**	**$58,130**	**$1,319,700**	**$68,100**	**$1,251,600**	**21.5**	**350,497**
ECM 9	Install High Efficiency Air Conditioning Units	No	118,451	127.1	0	$19,782	$939,500	$53,300	$886,200	44.8	119,279
ECM 10	Install High Efficiency Heat Pumps	Yes	229,612	177.6	0	$38,347	$380,200	$14,800	$365,400	9.5	231,217
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**552**	**$7,442**	**$302,900**	**$0**	**$302,900**	**40.7**	**64,588**
ECM 11	Install High Efficiency Hot Water Boilers	No	0	0.0	552	$7,442	$302,900	$0	$302,900	40.7	64,588
HVAC System Improvements			**13,030**	**0.0**	**159**	**$4,325**	**$26,700**	**$30**	**$26,670**	**6.2**	**31,772**
ECM 12	Implement Demand Control Ventilation (DCV)	Yes	13,030	0.0	150	$4,200	$26,500	$0	$26,500	6.3	30,691
ECM 13	Install Pipe Insulation	Yes	0	0.0	9	$125	$200	$30	$170	1.4	1,081
Domestic Water Heating Upgrade			**0**	**0.0**	**74**	**$1,003**	**$3,080**	**$780**	**$2,300**	**2.3**	**8,707**
ECM 14	Install Low-Flow DHW Devices	Yes	0	0.0	74	$1,003	$3,080	$780	$2,300	2.3	8,707
Food Service & Refrigeration Measures			**40,210**	**3.8**	**0**	**$6,715**	**$56,940**	**$2,940**	**$54,000**	**8.0**	**40,491**
ECM 15	Dishwasher Replacement	Yes	14,143	1.6	0	$2,362	$10,800	$700	$10,100	4.3	14,242
ECM 16	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	3,513	0.4	0	$587	$5,240	$560	$4,680	8.0	3,538
ECM 17	Refrigeration Controls	Yes	8,504	0.2	0	$1,420	$14,280	$630	$13,650	9.6	8,563
ECM 18	Replace Refrigeration Equipment	No	8,186	0.9	0	$1,367	$25,000	$900	$24,100	17.6	8,243
ECM 19	Vending Machine Control	Yes	5,863	0.7	0	$979	$1,620	$150	$1,470	1.5	5,904
Custom Measures* **			**-59,086**	**0.0**	**630**	**-$1,369**	**$17,400**	**$0**	**$17,400**	**-12.7**	**14,266**
ECM 20	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-59,086	0.0	630	-$1,369	$17,400	$0	$17,400	-12.7	14,266
TOTALS (COST EFFECTIVE MEASURES)			**1,217,736**	**419.6**	**90**	**$204,589**	**$1,185,680**	**$152,050**	**$1,033,630**	**5.1**	**1,236,807**
TOTALS (ALL MEASURES)			**1,285,288**	**547.6**	**1,272**	**$231,811**	**$2,470,480**	**$206,250**	**$2,264,230**	**9.8**	**1,443,184**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

*** - Negative payback explained in section 4.9

All Evaluated Energy Improvements[3]

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

---

[3] TRC bases estimated material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations.

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decision 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

Utility-run energy efficiency programs and 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.

Options from Your Utility Company

Prescriptive and Custom Rebates

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 Prescriptive and Custom Rebates 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 may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized contractor. This program can provide incentives up to 70% or 80% of the cost of selected measures. A Direct Install contractor will assess and verify individual measure eligibility and perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions 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.

For more details on these programs please contact your utility provider.

Options from New Jersey's Clean Energy Program

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 and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., 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.

Successor Solar Incentive Program (SuSI)

New Jersey is committed to supporting solar energy. Solar projects help the state reach the renewable goals outlined in the state's Energy Master Plan. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available, but certified solar projects are able to earn one SREC II (Solar Renewable Energy Certificates II) for each megawatt-hour of solar electricity produced from a qualifying solar facility.

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.

Large Energy User Program (LEUP)

LEUP is designed to promote self-investment in energy efficiency for the largest energy consumers in the state. Customers in this category spend about $5 million a year on energy bills. This program incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

For more details on these programs please visit New Jersey's Clean Energy Program website.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Washington township high 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.

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 December 19, 2023, TRC performed an energy audit at Washington Township High School located in Sewell, New Jersey. TRC met with Bob Schoenfeldt to review the facility operations and help focus our investigation on specific energy-using systems.

Washington Township High School consists of three connected buildings, the 9/10 building, the 11/12 building, and the core building. They are all two-story structures with a combined are of 450,130 square feet. The facility complex was built in 1961 and renovated in 1996. Building spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, kitchen, and mechanical areas.

Lighting throughout the facility is primarily provided by linear fluorescent T8 fixtures with electronic ballasts, supplemented by some LED fixtures. The 11/12 and core buildings are heated with boilers and have dedicated mechanical spaces while the 9-10 building is conditioned by individual heat pumps for classrooms, resistance heaters, and RTUs. All heating and cooling systems are controlled by a building automation system (BAS). The facility is equipped with emergency backup generators for lighting in all three buildings.

2.2 Building Occupancy

The school is occupied Monday through Friday during regular business hours. The school is fully occupied from September through June. Summer occupancy includes summer day camp and continuing maintenance activities. There are no weekend activities except in the gym and theater areas which are sometimes occupied for extracurricular activities.

Building Name	Weekday/Weekend	Operating Schedule
Washington Township High School Staff	Weekday	6:00 AM - 11:30 PM
	Weekend	Limited Use
Washington Township High School Classes	Weekday	7:20 AM - 2:50 PM
	Weekend	No

Building Occupancy Schedule

2.3 Building Envelope

The walls consist of concrete masonry units (CMUs) with a brick veneer and painted CMU interior finish. Steel trusses and a metal deck support the flat roof, finished with a covering of EPDM rubber roofing. The roof encloses conditioned space. Most windows are double paned with aluminum frames and a thermal break. The glass-to-frame seals are in good condition. The operable window weather seals are in fair condition, showing no evidence of excessive wear. Exterior doors are formed from composite material with aluminum frames. They are in fair condition with undamaged door seals. However, a few doors were observed with noticeable air gaps during the audit, causing infiltration. Degraded windows and door seals can increase drafts and outside air infiltration.

High School Area Map

Building Envelope-11/12

Building Envelope-9/10

Building Envelope-Core

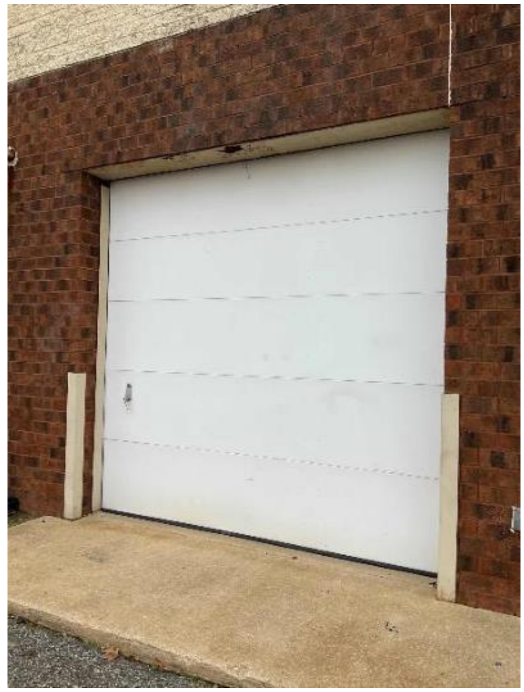
Roof Area-9/10

Roof Area-Core

Doors-11/12 Main Office

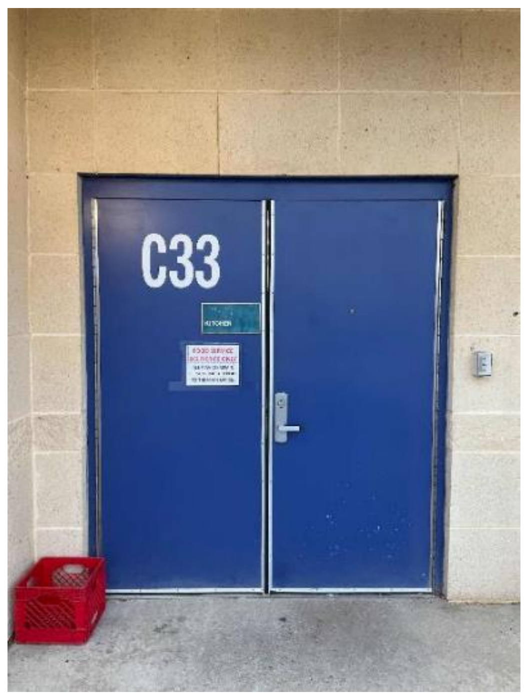
Door-9/10 Building

Typical Windows-High School



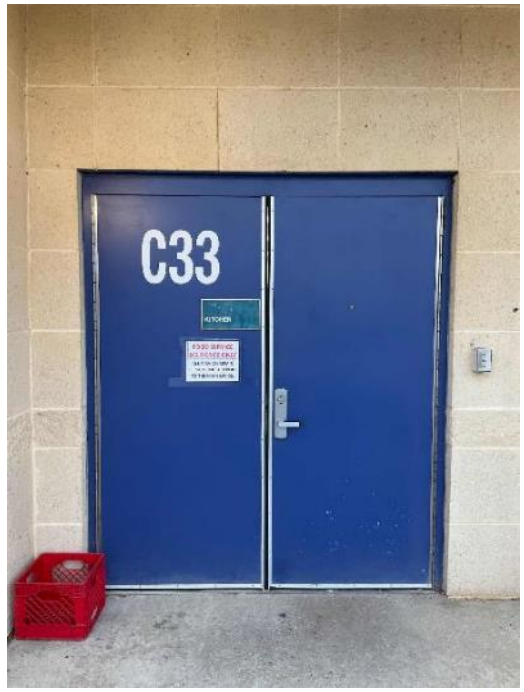
Typical Overhead Doors-High School

Typical Windows



Typical Doors

Door Gap: Infiltration-9/10



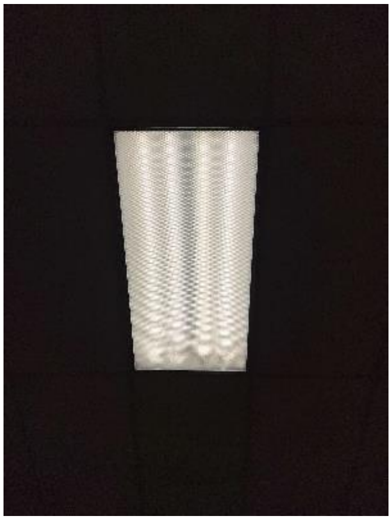
Typical Doors

2.4 Lighting Systems

The primary interior lighting system utilizes 32-Watt linear fluorescent T8 lamps. There are a few T12 fixtures in the locker rooms of the 11/12 building and the faculty offices in the 9/10 building. Linear fixture types mainly include 1-lamp, 2-lamp, 4-lamp, and 8-lamp, 4-foot-long recessed troffer fixtures with linear tubes. Typically, T8 fluorescent lamps use electronic ballasts, and T12 fluorescent lamps use magnetic ballasts.

Some of the linear fixtures have been converted to operate LED tube lamps. There are compact fluorescent lamps (CFL), high-pressure sodium lamps, incandescent bulbs, and LED general-purpose lamps used in various sections of the building. There are 2-foot x 4-foot and 2-foot x 2-footLED fixtures in corridors, some classrooms, and for stair illumination in the 11/12 building. Gymnasium fixtures employ manually controlled high bay LED lamps while all exit signs are LED. Most fixtures are in fair condition, and interior lighting levels are generally sufficient.

Lighting fixtures in most classrooms and restrooms are regulated by occupancy sensors, while fixtures in other areas including the gym, auditorium, hallways, and offices are controlled by manual wall switches.



Linear Fluorescent T8 Fixture

Fluorescent T8 Fixture

LED Fixture: Gym

U-Bend Fluorescent T8 Fixture

Linear Fluorescent T8 Fixture

LED Lamp

Incandescent Lamps

CFL Lamps

LED Fixture-2-foot x 2-foot

Linear Fluorescent T8 Fixture

LED Fixture- 2-foot x 4-foot

Linear LED Tubes

Studio: Metal Halide Fixtures

Linear Fluorescent T8 Fixture

LED Lamp

Theater HID Spotlights

Theater HID Spotlights

Studio: Metal Halide Fixtures

Exterior fixtures include wall packs, floodlights, canopy lights with a mix of high-intensity discharge (HID) LED lamps, and HID flood lamps.

The site has pole-mounted fixtures incorporating a mix of high intensity discharge (HID) and LED "corn" lamps, illuminating roadways and parking lots throughout the campus.

Fixtures are controlled by a photocell; however, several were observed to be operating during the day. Exterior light fixtures are controlled by a switch or photocell, depending on the fixture.

The athletic field/stadium has floodlights that use HID lamps. These lights are manually controlled through a switch located in the press box. They are typically used every night during the fall season, from dusk till 10 pm.

Exterior HID Wall Pack Fixtures

Exterior LED Pole Mounted

Exterior Incandescent Fixtures

Exterior HID Wall Pack Fixtures

Exterior LED Fixtures

Exterior Fixture

Exterior HID Fixtures

2.5 Air Handling Systems

Unit Ventilators

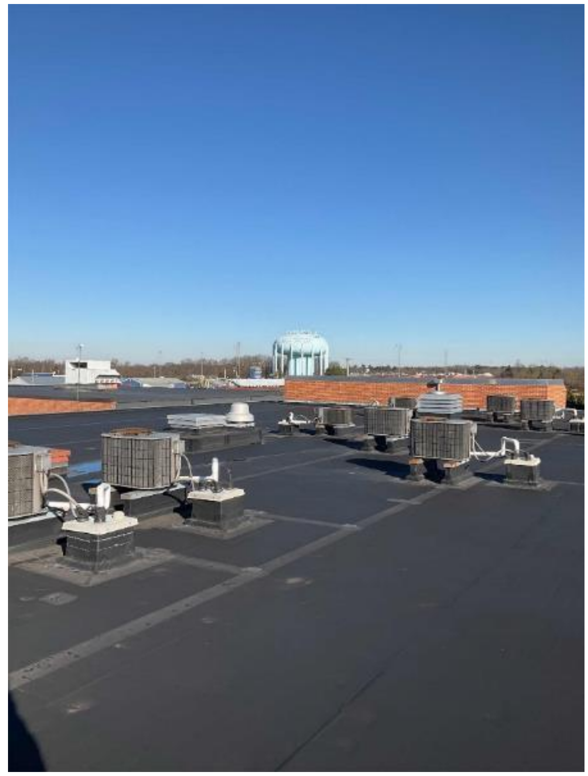
The unit ventilators condition the classroom areas in the 11/12 building. They are equipped with supply fan motors, which are controlled by the BAS. These ventilators are connected to the building's hot water distribution system and DX coil condensing units, providing heating, cooling, and ventilation to the classrooms. The system is in fair operating condition.

The condensing units for these units are located on the rooftop. Most of these units are York brand condensing units that were installed around 2006. They are all operating beyond their useful life, in fair condition, and are of standard efficiency. Additionally, there are a few Thermal Zone condensing units that are of standard efficiency, operating within their useful life, and in fair condition.

Typical Classroom Unit Ventilators

Typical Classroom Unit Ventilators

Condensing Unit-Rooftop



Condensing Units-Rooftop

Condensing Unit-Rooftop

Condensing Unit-Rooftop

Unitary Electric HVAC Equipment

In addition to condensing units paired with unit ventilators in the 11/12 building, there are split system air conditioning units with small indoor fans in all three buildings that serve different offices, server room, locker rooms, and some of the classrooms. They range from 0.75 tons to 10 tons.

Additionally, there are split air-source heat pump (HP) systems in the 9/10 and 11/12 buildings that serve various areas and are of standard efficiency. The air source heat pumps, which serve various classrooms and offices in the 9/10 building, are 4-ton Airedale units installed between 1993 and 2013. Many of these units are operating beyond their useful life and are being evaluated for replacement.

In classroom 209 of the 9/10 building, there is an LG window air conditioner with 6,000 Btu/h and an 11.3 EER rating.

Many of these units are currently operating beyond their useful life and are of standard efficiency, so they are evaluated for replacement. Most of these units are controlled and operated through the BAS system.

Condensing Unit

Condensing Unit

Ceiling Cassette- Split System-9/10 Building

Indoor Unit- Split System-9/10 Building

Split Air Source Heat Pump-11/12 Building

Window AC-9/10 Building

Unitary Heating Equipment

Some areas in the 11/12 building including the kitchen and athletic offices have electric resistance heaters. These heaters are estimated to be about 3 kW each.

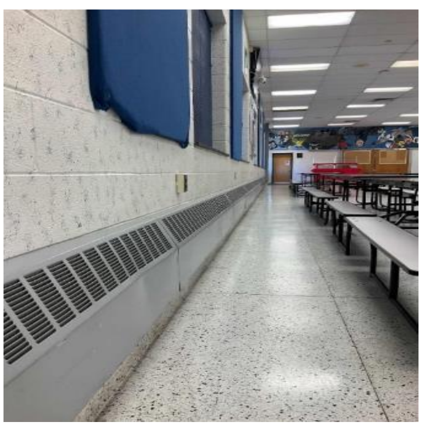
The 9/10 building also has a few electric resistance heaters in the mechanical room, storage receiving area, dining room, and library room. These heaters vary in size. Smaller units are controlled by manual dial thermostats, while others are controlled by BAS. All the units are in good condition.

Additionally, several hot water-supplied unit heaters are located in storage rooms and classrooms.

Unit Heater-Kitchen-11/12

Unit Heater–Athletic Office-11/12

Unit Heater-Storage-9/10



Unit Heater-Dining-9/10

Unit Heater-Hot Water-Theatre

Unit Heater-Hot water-Mechanical Core room

Packaged Units

The outer perimeter of the 9/10 building is heated and cooled using packaged air source heat pumps as described previously, while the inner perimeter zones utilize packaged water source heat pumps.

Two cooling towers on the 9/10 building serve the water source heat pumps; some areas are served by Heatcraft and Westinghouse dry coolers. The water source heat pumps vary in size from 3 tons to 6 tons and are of standard efficiency. They consist of a mix of Airedale Classmate units and EDPAC heat pump units installed between 1980 and 2016, all equipped with supplemental additional electric resistance heaters.

Several package roof top air conditioner units serving different sections of the high school. These units range in size from 3 tons to 60 tons and were mostly installed between 1995 and 2017. A Trane 27.50-ton air conditioner with gas heat serves the gym area of the 9/10 building. It was installed in 2017 and is in fair condition. Remaining package units are equipped with hot water heating coils. Packaged units are equipped with economizers, which are in fair condition.

Most units are old and are being evaluated for replacement, although they are still in fair condition. All the rooftop package units and the package heat pumps serving classrooms are controlled from the BAS system.

The following table illustrates the building areas served and the size of packaged rooftop and water source heat pump units. Information is estimated where nameplates were missing or obscured.

Area Served/ Unit	Unit Type	Quantity	Cooling Size (Ton)	Heating Size/System (MBh)	Manufacturer
Server room	Package Unit	1	5.00	Hot Water	McQuay
Gym Area	Package Unit	2	27.50	480 (Gas Heat)	Trane
Kitchen Core building	Package Unit	2	3.00	Hot Water	York
Core Building	Package Unit	1	12.50	Hot Water	Trane
11-12 Building-RTU 1	Package Unit	1	12.50	Hot Water	York
11-12 Building-RTU 8	Package Unit	1	7.50	Hot Water	York
Dance studio	Package Unit	1	7.50	Hot Water	N/A
11-12 Building	Package Unit	1	10.00	Hot Water	N/A
Wood shop-RTU 11	Package Unit	1	7.50	Hot Water	N/A
RTU 4	Package Unit	1	7.50	Hot Water	York
RTU 3	Package Unit	1	10.00	Hot Water	N/A
Dance studio-RTU 12	Package Unit	1	7.50	Hot Water	York
11-12 Building	Package Unit	1	7.50	Hot Water	N/A
RTU 7	Package Unit	1	7.50	Hot Water	York
RTU 30	Package Unit	1	7.50	Hot Water	York
RTU 27	Package Unit	1	7.50	Hot Water	York

Area Served/ Unit	Unit Type	Quantity	Cooling Size (Ton)	Heating Size/System (MBh)	Manufacturer
RTU 24	Package Unit	1	15.00	Hot Water	Aaon
RTU 26	Package Unit	1	5.00	Hot Water	York
Auditorium RTU	Package Unit	1	60.00	Hot Water	Aaon
RTU 16	Package Unit	1	10.00	Hot Water	York
RTU 17	Package Unit	1	7.50	Hot Water	York
11-12 Building	Package Unit	1	13.00	Hot Water	Aaon
RTU 18-19-22-23 Gym Area	Package Unit	4	25.00	Hot Water	York
RTU 2- 36	Package Unit	2	3.00	Hot Water	York
RTU 14	Package Unit	1	10.00	Hot Water	York
11-12 Building C block	Package Unit	1	13.00	Hot Water	Aaon
11-12 Building Band Room	Package Unit	1	30.00	Hot Water	Aaon
11-12 Building Dance Room	Package Unit	2	3.00	Hot Water	Daikin
Trainer's Room	Package Unit	1	7.50	Hot Water	Carrier
11-12 Building C block	Package Unit	1	15.00	Hot Water	Aaon
RTU 32	Package Unit	1	3.00	Hot Water	York
11-12 Building	Package Unit	1	7.50	Hot Water	York
Package unit-Maze duct	Package Unit	1	30.00	Hot Water	York
RTU-29	Package Unit	1	7.50	Hot Water	York
Various Classroom-9/10 Building	Water Source Heat Pumps	19	3.00	Heat Pump & Electric Resistance	Airedale

Area Served/ Unit	Unit Type	Quantity	Cooling Size (Ton)	Heating Size/System (MBh)	Manufacturer
Classroom I113-9/10 Building	Water Source Heat Pumps	1	4.00	Heat Pump & Electric Resistance	Airedale
Office Faculty-J202-9/10 Building	Water Source Heat Pumps	1	5.00	Heat Pump & Electric Resistance	Airedale
Various Classroom-9/10 Building	Water Source Heat Pumps	9	4.00	Heat Pump & Electric Resistance	EDPAC
Various Classroom-9/10 Building	Water Source Heat Pumps	3	5.00	Heat Pump & Electric Resistance	EDPAC
Various Classroom-9/10 Building	Water Source Heat Pumps	4	6.00	Heat Pump & Electric Resistance	EDPAC

Refer to Appendix A for detailed information about each unit.

Package Unit-Gym Area-11/12

Package Unit-Gym Area-11/12

Package Unit with Gas Heat-Gym Area-9/10 Building

Package Unit-Kitchen Area

Package Heat Pumps-9/10 Building

Package Heat Pumps-9/10 Building

Package Heat Pumps-9/10 Building

Package Heat Pumps-9/10 Building

Air Handling Units (AHUs)

The facility is conditioned by several air-handling units. The core building has several AHUs, each equipped with a supply and return fan motor, a hot water heating coil, and chilled water coil for cooling. Additionally, there are two heat recovery units located on the core building roof. Several fan coil units serve different core building sections and classrooms, but these units are located above the ceiling and were inaccessible during the audit. The air handling unit located in the mechanical section of the 9/10 building is an exception as it provides heat through an electric resistance heater.

All the units are of standard efficiency and are in fair condition. The capacity of the supply and return fan motors vary between the units; most supply fan motors over 7.5 hp have variable frequency drives (VFD) while most supply fan motors of small capacity do not. The HVAC systems are controlled by the facility's BAS.

It should be noted that reducing zone temperature setpoints to 68°F or lower during the heating season and increasing this setpoint to 72°F or higher during the cooling season will provide energy savings at no cost.

Details about the hot water heating system can be found in Section 2.6 while information about the chilled water system is provided in Section 2.7.

Refer to Appendix A for detailed information about each unit.

Air Handling Unit-Library (Core Building)

Air Handling Unit-Cafeteria (Core Building)

Air Handling Unit-9/10 Building

Heat Recovery Unit-Core Building

2.6 Heating Hot Water Systems

The 11/12 building is heated using eight Hydrotherm 3,000 MBh condensing hot water boilers. These boilers have fully modulating burners with a nominal efficiency of 95.7% in condensing mode. An automated lead-lag control system is used to activate multiple boilers during high-load conditions. These boilers are currently operating as expected and are within their normal lifespan.

In the core building, two Bryan boilers with a capacity of 5,125 MBh each are used for heating. These boilers also have fully modulating burners with a nominal efficiency of 80%. An automated lead-lag control system is used to configure the rotation frequency, which is set by the BAS. Despite being manufactured around 1996, these boilers are still in good condition.

The hydronic distribution system for the core building provides heating and cooling. The 11/12 building is equipped with a heating-only loop because the unit ventilators are attached to rooftop condensing units for cooling.

The core building boilers are arranged in a variable flow primary distribution system with two, 25 hp VFD-controlled hot water pumps. These pumps operate in an automated lead-lag control scheme with rotation frequency set from the BAS.

The 11/12 building boilers are set up in a variable flow primary distribution system with two, 25 hp and two, 10 hp VFD-controlled hot water pumps operating in an automated lead-lag control scheme with rotation frequency set from the BAS.

The boilers supply hot water to air handling units and rooftop package units throughout their respective buildings, and the insulation for the boiler pipes is in good condition.

During the audit, the BAS readout for the core building boilers indicated that hot water was being supplied at 164°F with the return temperature registering at 155°F. For condensing boilers, it is important to note that these types of systems operate most efficiently when the return water temperature is below 130°F. Lowering the return water temperature to about 130°F will allow vapor to condense out of the flue gas, which improves efficiency. This efficiency increase is roughly linear with a corresponding drop in return water temperature. We highly recommend you investigate whether the core building loop temperature can be reduced sufficiently to maximize the efficiency of the condensing boilers.

Condensing Boiler-11/12 Building

Hydronic Boiler-Core Building

Condensing Boiler-11/12 Building

Hydronic Boiler-Core Building

Heating Hot Water Pump-11/12 Building

Heating Hot Water Pump-Core Building

2.7 Chilled Water Systems

The chiller plant consists of two Trane rotary air-cooled chillers, one with a capacity of 250 tons and the other with 275 tons. They are situated outside the core building. The 250-ton chiller provides cooling for the entire core building, while the 275-ton chiller is designated explicitly for the theatre area within the core building.

The chiller plant includes two, 60 HP chilled water pumps with variable frequency drives (VFD) and a 30 HP chilled water pump without VFD for the theatre area.

The chilled water supply temperature adjusts according to the outside air temperature, with a baseline setpoint of 45°F regulated by the BAS. The chiller plant shuts down when the outside air temperature drops below 25°F. Facility maintenance personnel manually control the staging of chillers to meet the cooling demand, utilizing the minimum number of chillers necessary.

In the 9/10 building, a cooling tower serves several water source heat pumps (WSHP) in various classrooms. The EDPAC and Airedale heat pumps utilize the cooling tower for heat rejection. Two, 25 hp pumps alternate serving the WSHP loop, switching roles every seven days.

Additionally, two dry coolers, one Heatcraft and one Westinghouse, are in the 9/10 main office area and the mechanical room AHU system where they function as air coolers for the heat pumps.

Air Cooled Chiller-Core Building

Chilled Water Pumps

Air Cooled Chiller

Cooling Tower-Water Source Heat Pump

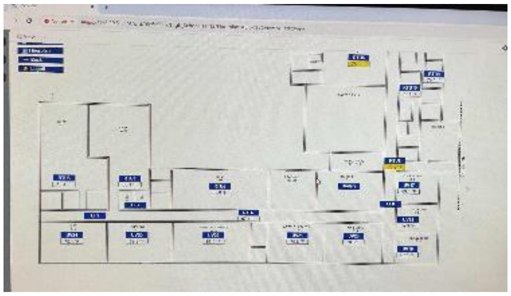
Chilled Water Pump

Dry Cooler- Office-9/10 Building

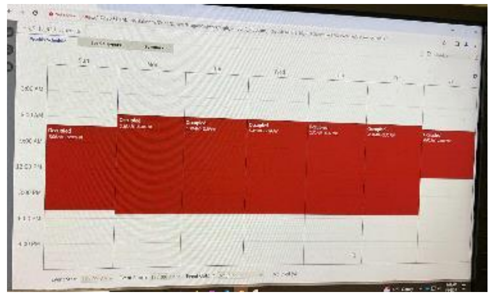
2.8 Building Automation System (BAS)

A Siemens BAS controls the HVAC equipment, including air handlers and package units. The existing BAS is utilized to monitor and control the status of building chillers, rooftop package units, unit ventilators, air handling units, exhaust fans, VAV boxes, and boilers. The BAS offers equipment scheduling control, enabling users to manage temperature settings based on predefined schedules.

Additionally, the BAS provides a graphical interface that offers users an insightful view of the various HVAC components and their operational status. The occupied cooling and heating setpoints are 71°F and 69°F, respectively. The unoccupied setpoints for cooling and heating are 85°F and 65°F, respectively. The settings for occupied heating and cooling are determined by the building's operation. Typically, classrooms and similar locations are scheduled from 6:00 AM to 3:00 PM for occupied settings, while other parts of the building, such as the auditorium, theater, and gymnasium, are set according to the typical occupancy of each area, considering various events. These settings are adjusted accordingly.

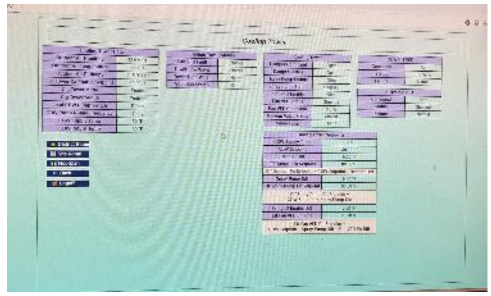


A Block-11/12 Building BAS

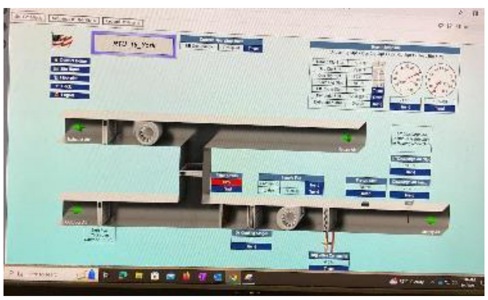


RTU Schedule-9/10 Building

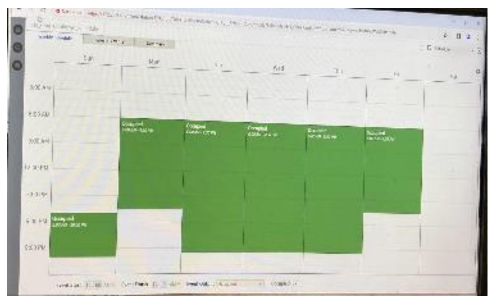
Unit Ventilator-9/10 Building



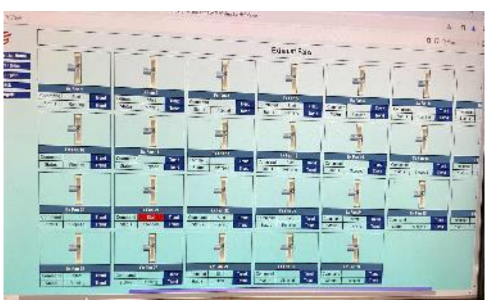
Cooling Tower-9/10 Building



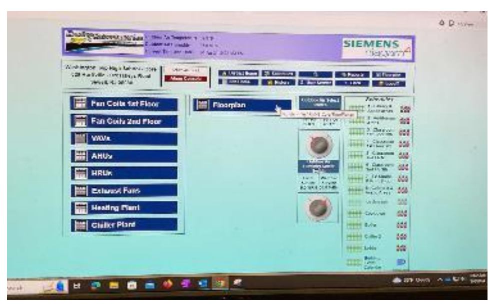
RTU-18: 11/12 Building



Building Occupancy Schedule: Core Building



Exhaust Fan: 11/12 Building



BAS: Core Building

2.9 Domestic Hot Water

Hot water for the 9/10 building comes from four natural gas-fired storage water heaters. Three of them are Lochinvar brand, each with a capacity of 110 gallons and an input capacity of 285 MBh. The fourth one, in the electrical room serving the kitchen, is a Bradford White brand with an 80-gallon capacity and rated at 180 MBh input.

In the 11/12 building, there are three identical Bradford White brand gas-fired water heaters, each with a 100-gallon capacity with an input of 300 MBh.

In the theatre area of the core building, hot water is produced by a 98-gallon, 199 MBh gas-fired storage water heater.

During the site visit, the domestic water heaters were set at 140°F. All the hot water heaters are standard efficiency and are operating within their useful service life.

The domestic hot water pipes are partially insulated for the DHW heater located in the electrical room of the 9/10 building. Apart from that unit, all other domestic hot water pipes are well insulated, and the insulation is in fair condition. Refer to Appendix A for detailed information about each unit.

DHW Heater: Cafeteria-9/10

DHW Heater: Mechanical-9/10

DHW Heater: 11/12

DHW Heater: 11/12

DHW Heater: Core Building

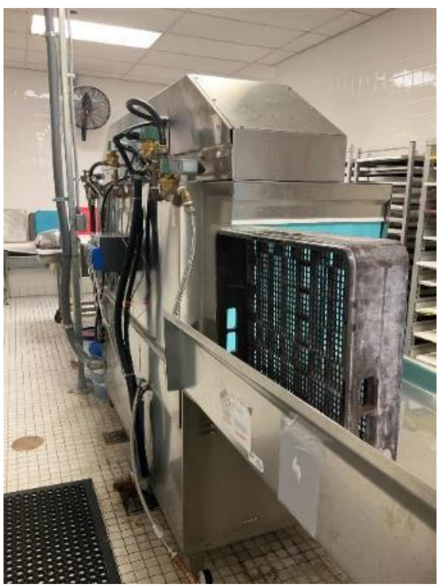
2.10 Food Service Equipment

Buildings 9/10 and 11/12 are each served by dedicated kitchens. Kitchen areas contain a combination of gas and electric equipment utilized for preparing breakfast and lunch for students. The primary method of cooking involves the use of a convection electric oven. Additionally, bulk-prepared foods are stored in multiple electric holding cabinets. Although the equipment is in good condition, it is not highly efficient.

The dishwashers in the kitchen areas of the 9/10 and 11/12 buildings are mix of ENERGY STAR and non-ENERGY STAR high-temperature, door-type units. They are both equipped with electric booster heaters rated at 30 kW. There are also a few under-counter dishwashers present in the classrooms used for culinary activities by the students.

While cost effective opportunities to replace equipment are limited at this time, we recommend that you work with your food service equipment suppliers to maintain the equipment in a way that minimizes energy use. This may include cleaning air intakes and exhausts or other methods of keeping your existing equipment operating in top shape. When food service equipment is eventually replaced, consider installing high efficiency or ENERGY STAR labeled equipment.

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



Dishwasher-9/10 Building

Insulated Food Holding Cabinet (Full Size)

Electric Convention Oven (Full Size)-9/10 Building

Electric Steamer-11/12 Building

2.11 Refrigeration

Kitchen areas are equipped with several stand-up refrigerators featuring both solid and glass doors, along with a few refrigerator chests. All equipment is of standard efficiency and in good condition.

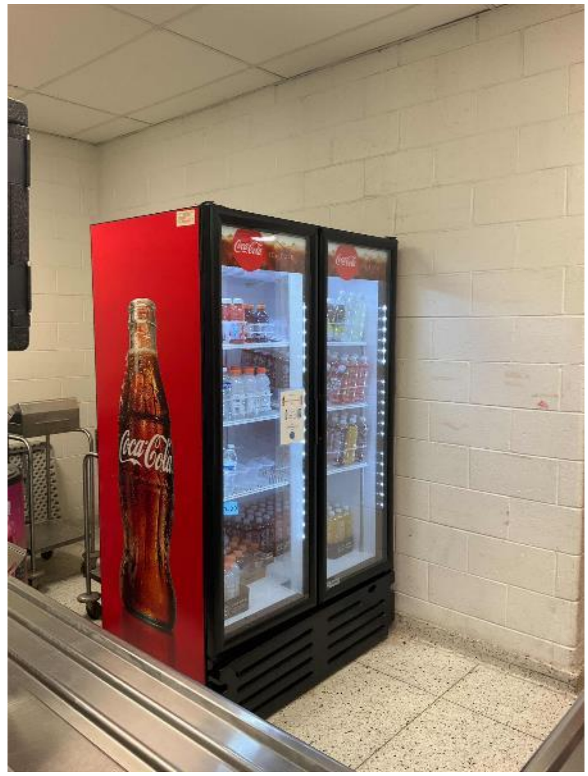
The facility houses three walk-in refrigerators with estimated capacities ranging from 0.78 tons to 1.08 tons. Each unit is equipped with two evaporator fans. These refrigerators are in the kitchen areas of 9/10 and 11/12, with one unit located in the exterior part of the building. They are locally controlled by thermostats.

Three walk-in freezers are located in the kitchen areas of 9/10 and 11/12, with one of the units situated in the exterior part of the building. Capacities range from 1 ton to 1.23 tons. Two are equipped with three-fan evaporators, while one has a two-fan evaporator. As with the walk- in coolers, these units are locally controlled by thermostats and are used to store food and beverages.

Our analysis determined that this building's refrigeration equipment accounts for a relatively high proportion of overall energy use. While cost-effective opportunities to replace equipment are limited at this time, we recommend that you work with your refrigeration suppliers to maintain equipment in a way that minimizes energy use. When refrigeration equipment does need to be replaced, consider installing high-efficiency or ENERGY STAR-labeled equipment.

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

Typical Standup Solid Door Refrigerator



Typical Standup Glass Door Refrigerator

Walk-in Cooler: Exterior: 9/10 Building

Medium Temp Freezer: Kitchen 9/10 Building

Low Temp Freezer: Kitchen 11/12 Building

Exterior Freezer and Cooler Set points

2.12 Plug Load and 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 476 computer workstations throughout the facility. Plug loads include general cafe and office equipment. Additionally, there are typical classroom loads such as smartboards, printers, projectors, televisions, and fans. There is a server and various IT equipment.

Several residential-style refrigerators, which vary in condition and efficiency, are placed throughout the building for storing food. Furthermore, kilns are located in the classrooms along with several other lab equipment, such as 3D printers, laser cutting machines, woodshop equipment, mixers, pottery wheels, and paper cutters. Additionally, there are serving tables (heated and cooled) in the kitchen area.

Although the facility lacks commercial laundry equipment, normal residential-style clothes washers and dryers are spread across the three buildings. Medify Air brand air purifiers are also distributed throughout the facility.

The 9/10 building has a Campbell Hausfeld 5 HP compressor with a 100-gallon storage receptacle, while the 11/12 building houses a few small air compressors mainly used in the wood shop lab.

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

Serving Table

Clothes Washer and Dryer

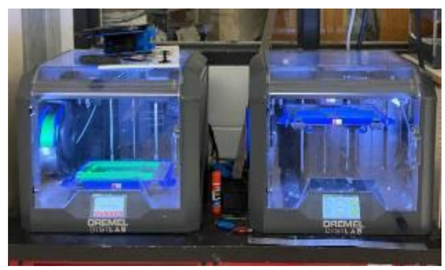
Printer/Copier

Non-Refrigerated Vending Machine

Residential-Style Refrigerators

Air Purifier

Typical Classroom Kiln



3D Printer

Laser Equipment

2.13 Water-Using Systems

Water is supplied by a municipal water supply company. Potable water serves various purposes including drinking, cleaning, cooking, sanitary needs, and building conditioning.

EPA WaterSense® has set maximum flow rates for sanitary fixtures. They are: 1.28 gallons per flush (gpf) for toilets, 0.5 gpf for urinals, 1.5 gallons per minute (gpm) for lavatory faucets, and 2.0 gpm for showerheads. There are several restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gpm or higher.

Girls and boys locker rooms are frequently utilized in the gymnasium area. The kitchens are equipped with pre-rinse sprayers, commercial ice maker, and a mix of ENERGY STAR and Non-ENERGY STAR dishwashers.

Typical Kitchen Faucet-9/10 Building

Typical Restroom Faucet-9/10 Building

Typical Restroom Faucet-1/12 Building

Typical Kitchen Faucet-11/12 Building

2.14 On-Site Generation

The high school has four emergency generators. These generators are used for lighting and the server room during power outages and are dedicated solely to emergency needs. The core building has a diesel-fired generator specifically for emergency lighting, while the 11/12 and 9/10 buildings have gas-fired generators for lighting purposes. Additionally, there is an emergency generator serving the server room.

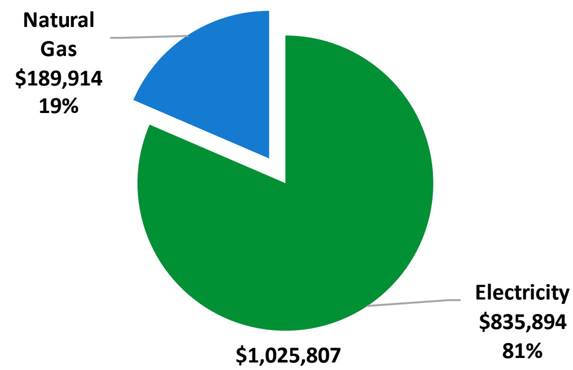
Gas Fired Emergency Generator

Diesel-Fired Emergency Generator

3 Energy and Water Use and Costs

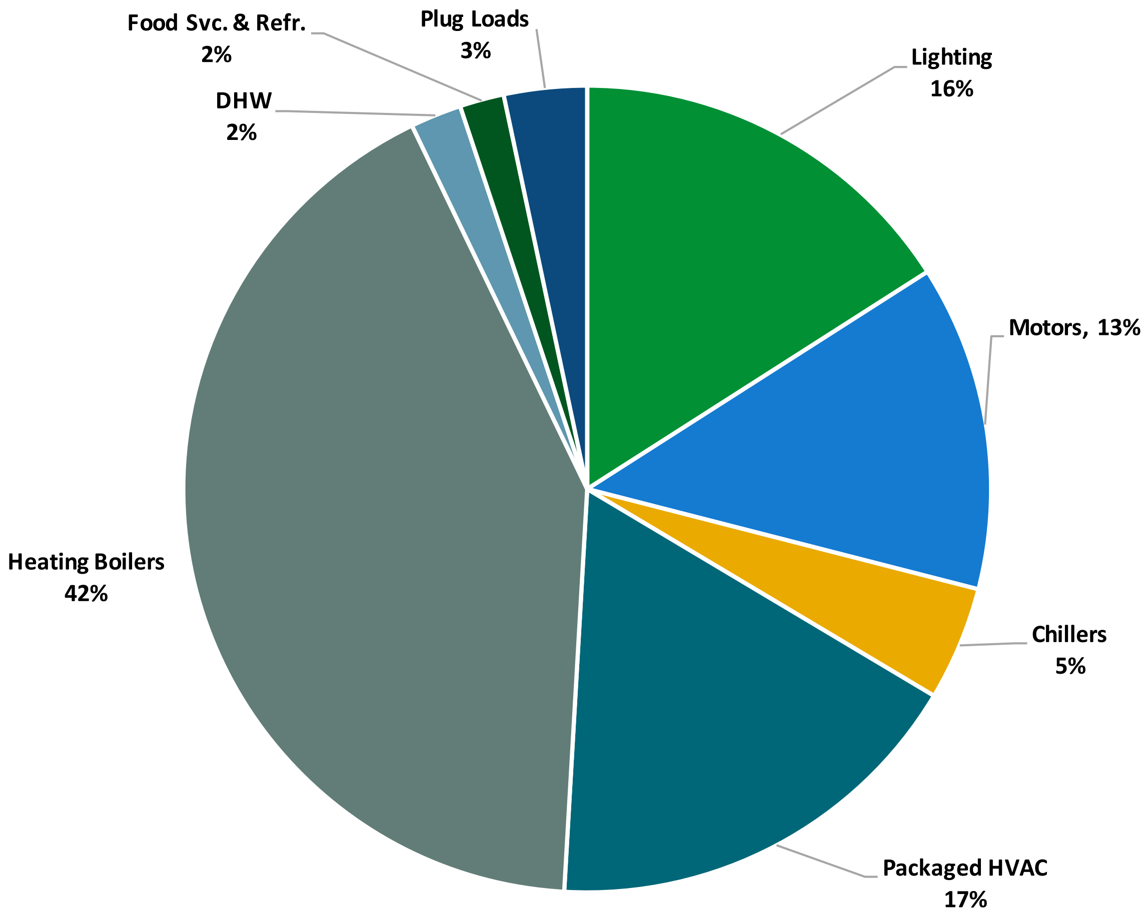
Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	5,005,083 kWh	$835,894
Natural Gas	140,780 Therms	$189,914
Total		**$1,025,807**



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.

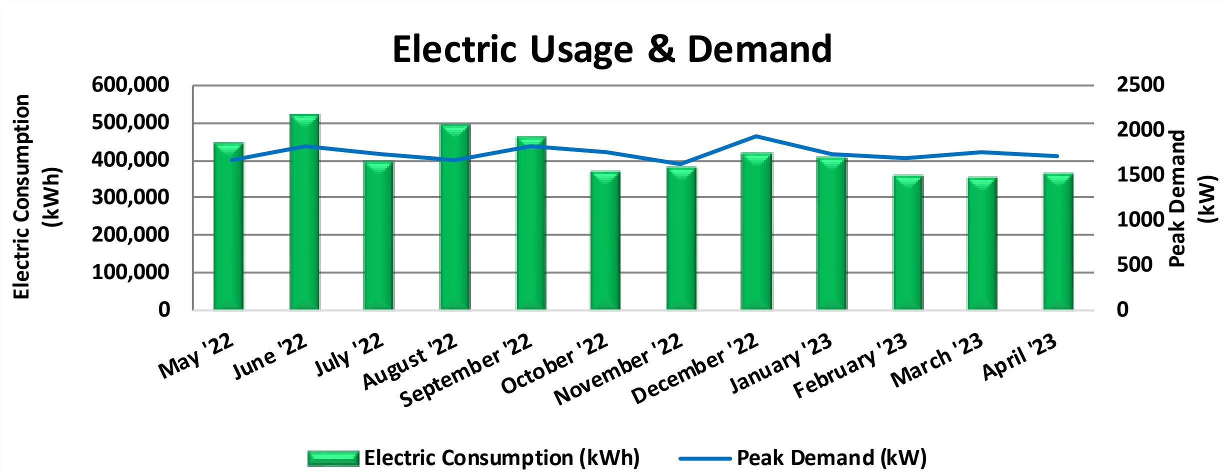
The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated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



Energy Balance by System

3.1 Electricity

Atlantic City Electric delivers electricity under rate class Monthly General Service Secondary.



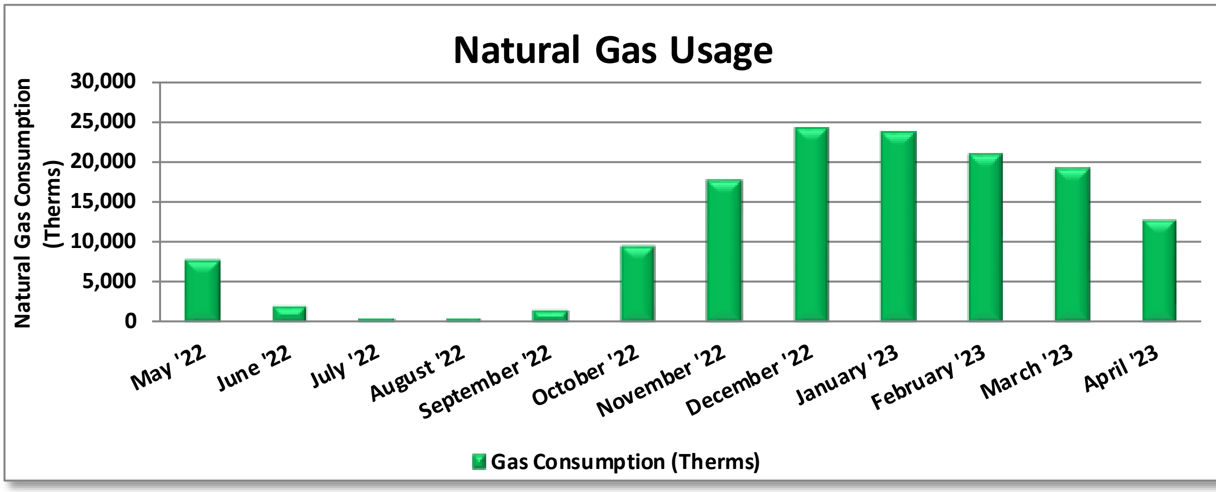
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
5/27/22	29	445,948	1,681	$20,380	$70,597
6/29/22	33	518,904	1,819	$23,383	$79,124
7/28/22	29	394,457	1,739	$20,445	$63,296
8/30/22	33	489,324	1,661	$22,767	$65,602
9/29/22	30	459,226	1,831	$22,344	$78,636
10/28/22	29	371,606	1,763	$21,097	$66,866
11/29/22	32	382,320	1,617	$20,681	$66,827
12/29/22	30	419,017	1,939	$24,039	$74,530
1/30/23	32	407,224	1,734	$22,861	$72,108
2/27/23	28	359,093	1,701	$19,797	$62,914
3/27/23	28	350,581	1,765	$20,878	$64,012
4/25/23	29	366,245	1,707	$20,058	$64,510
Totals	**362**	**4,963,945**	**1,939**	**$258,730**	**$829,023**
Annual	**365**	**5,005,083**	**1,939**	**$260,875**	**$835,894**

Notes:

- Peak demand of 1,939 kW occurred in December '22.
- Average demand over the past 12 months was 1,747 kW.
- The average electric cost over the past 12 months was $0.167/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.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service LV FT(SJ-GSGLV), with natural gas supply provided by UGI Energy Services, LLC, a third-party supplier.



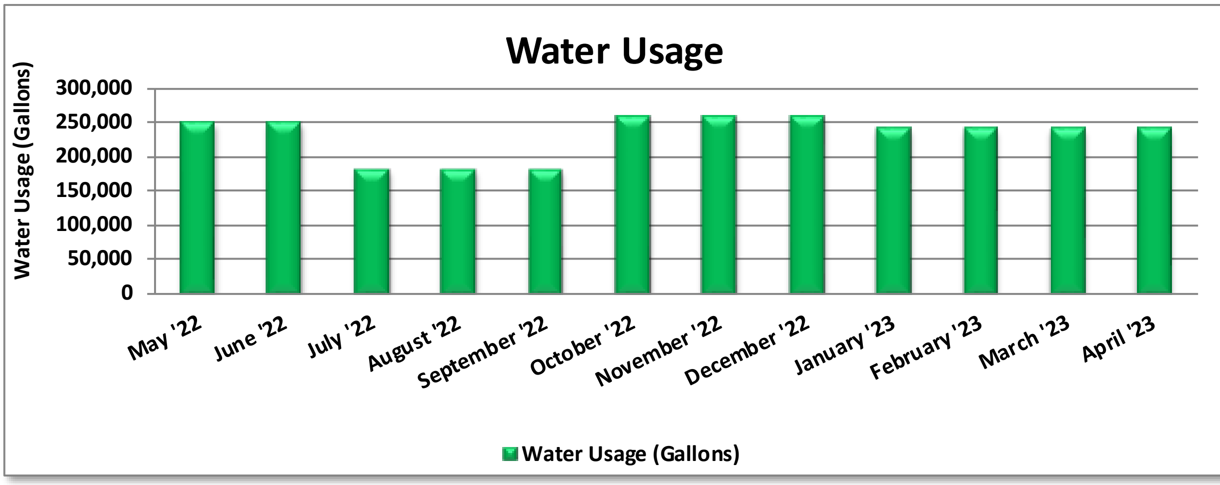
Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
5/26/22	28	7,570	$11,294
6/29/22	34	1,800	$3,824
7/28/22	29	434	$1,556
8/30/22	33	478	$1,744
9/29/22	30	1,385	$2,980
10/28/22	29	9,467	$12,685
11/23/22	26	17,707	$22,874
12/29/22	36	24,221	$32,936
1/30/23	32	23,562	$32,297
2/27/23	28	20,988	$27,458
3/27/23	28	19,224	$24,204
4/25/23	29	12,786	$14,501
Totals	**362**	**139,622**	**$188,353**
Annual	**365**	**140,780**	**$189,914**

Notes:

- The average gas cost for the past 12 months is $1.349/therm, which is the blended rate used throughout the analysis.

3.3 Water

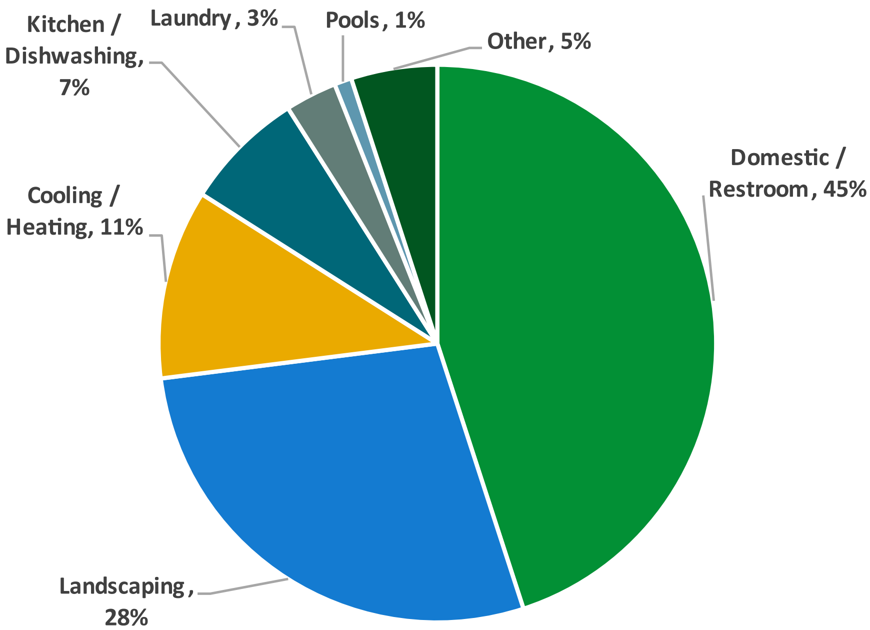
Washington Township Municipal Utilities Authorities delivers water to the project site.



Water Billing Data			
Period Ending	Days in Period	Water Usage (gallons)	Water Cost
5/27/22	29	249,333	$1,841
6/29/22	33	249,333	$1,841
7/28/22	29	181,667	$1,657
8/30/22	33	181,667	$1,657
9/29/22	30	181,667	$1,657
10/28/22	29	258,333	$1,898
11/29/22	32	258,333	$1,898
12/29/22	30	258,333	$1,898
1/30/23	32	241,917	$1,839
2/27/23	28	241,917	$1,839
3/27/23	28	241,917	$1,839
4/25/23	29	241,917	$1,839
Totals	**362**	**2,786,333**	**$21,701**
Annual	**365**	**2,809,424**	**$21,881**

Notes:

- The average cost of water for the past 12 months is $0.0078/gal.



Typical Education Water End Use[4]

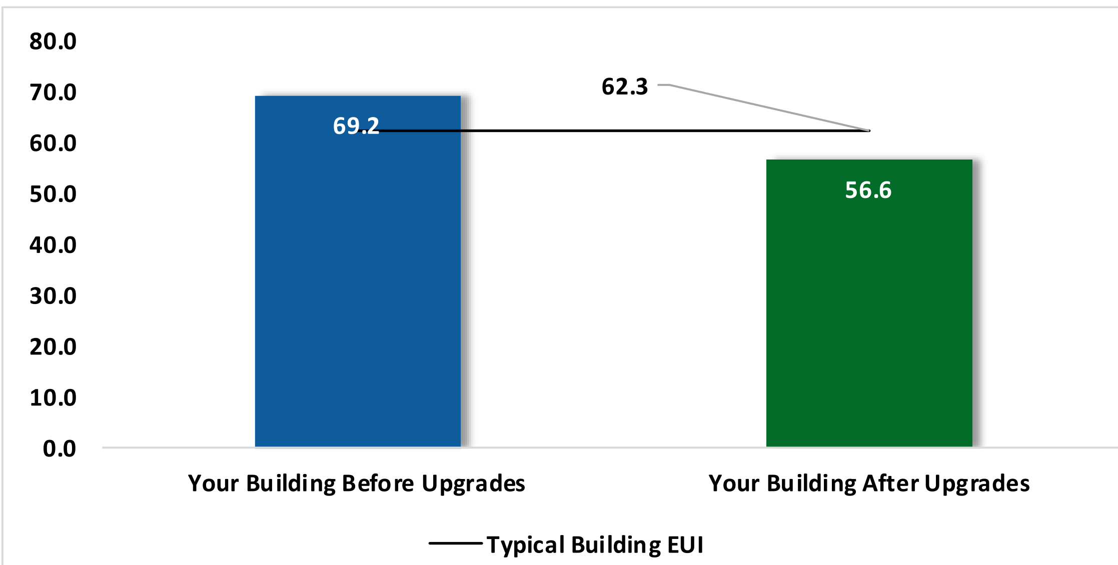
[4] Chart is of typical water end use and not specific to the facility.

3.4 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.

Benchmarking Score	38



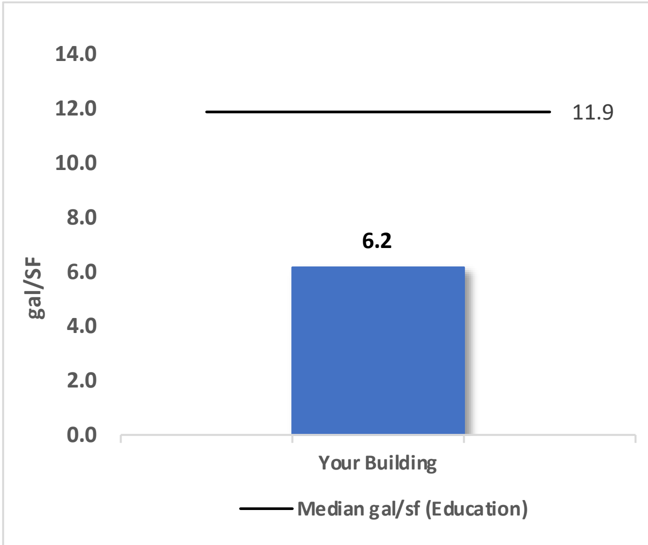
Energy Use Intensity Comparison[5]

This building performs at, or 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. Several factors can cause a building to vary from 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.

[5] Based on all evaluated ECMs

Water Benchmarking



A benchmark is provided for your building's water use based on the annual water use in gallons per square foot of building area (gal/sf-yr.). Your building is compared to other similar buildings based on average water usage as available from the 2012 Commercial Buildings Energy Consumption Survey (CBECS) and from the EPA ENERGY STAR DataTrends Water Use Tracking database.

Tracking your Energy Performance

Keeping track of your energy and water use on a monthly basis is one of the best ways to keep utility costs in check and keep your facility operating efficiently. 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 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.

3.5 Understanding Your Utility Bills

The State of New Jersey Department of the Public Advocate provides detailed information on how to read natural gas and electric bills. Your bills contain important information including account numbers, meter numbers, rate schedules, meter readings, and the supply and delivery charges. Gas and electric bills both provide comparisons of current energy consumption with prior usage.

Sample bills, with annotation, may be viewed at:
https://www.nj.gov/rpa/docs/Understanding_Electric_Bill.pdf
https://www.nj.gov/rpa/docs/Understanding_Gas_Bill.pdf

Why Utility Bills Vary

Utility bills vary from one month to another for many reasons. For this reason, assessing the effects of your energy savings efforts can be difficult.

Billing periods vary, typically ranging between 28 and 33 days. Electric bills provide the kilowatt-hours (kWh) used per month while gas bills provide therms (or hundreds of cubic feet - CCF) per month consumption information. Monthly consumption information can be helpful as a tool to assess your efforts to reduce energy, particularly when compared to monthly usage from a similar calendar period in a prior year.

Bills typically vary seasonally, often with more gas consumed in the winter for heating, and more electricity used in the summer when air conditioning is used. Facilities with electric heating may experience higher electricity use in the winter. Seasonal variance will be impacted by the type of heating and cooling systems used. Normal seasonal fluctuations are further impacted by the weather. Extremely cold or hot weathers causes HVAC equipment to run longer, increasing usage. Other monthly fluctuations in usage can be caused by changes in building occupancy. Utility bills provide a comparison of usage between the current period and comparable billing month period of the prior year. Year-to-year monthly use comparisons can point to trends with energy savings for measures/projects that were implemented within the timeframe, but these comparisons do not account for changing weather of occupancy patterns.

The price of fuel and purchased power used to produce and delivery electricity and gas fluctuates. Any increase or decrease in these costs will be reflected in your monthly bill. Additionally, billing rates occasionally change after justification and approval of the NJBPU. For this reason, it is more useful to review energy use rather than cost when assessing energy use trends or the impact of energy conservation measures implemented.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements and provide information about the cost effectiveness of those improvements. Most energy conservation measures have received preliminary analysis of feasibility, which identifies expected ranges of savings. 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 in this report are based on the previously run state rebate program SmartStart, which has been retired. Now, all investor-owned gas and electric utility companies are offering complementary energy efficiency programs directly to their customers. Some measures and proposed upgrades may be eligible for higher incentives than those shown below. The incentives in the summary tables should be used for high-level planning purposes. To verify incentives, reach out to your utility provider or visit the NJCEP website for more information.

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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**769,763**	**191.1**	**-136**	**$126,718**	**$559,860**	**$88,370**	**$471,490**	**3.7**	**759,180**
ECM 1	Install LED Fixtures	Yes	158,873	39.6	-9	$26,409	$218,220	$16,670	$201,550	7.6	158,903
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	2,029	0.5	0	$333	$1,390	$130	$1,260	3.8	1,994
ECM 3	Retrofit Fixtures with LED Lamps	Yes	608,861	150.9	-127	$99,976	$340,250	$71,570	$268,680	2.7	598,284
Lighting Control Measures			**93,618**	**21.1**	**-20**	**$15,371**	**$82,500**	**$35,530**	**$46,970**	**3.1**	**91,980**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	41,947	11.4	-9	$6,887	$37,410	$4,260	$33,150	4.8	41,214
ECM 5	Install High/Low Lighting Controls	Yes	51,670	9.6	-11	$8,484	$45,090	$31,270	$13,820	1.6	50,766
Variable Frequency Drive (VFD) Measures			**79,690**	**27.0**	**12**	**$13,477**	**$101,400**	**$10,500**	**$90,900**	**6.7**	**81,703**
ECM 6	Install VFDs on Constant Volume (CV) Fans	Yes	57,607	20.9	0	$9,621	$79,600	$8,800	$70,800	7.4	58,010
ECM 7	Install VFDs on Chilled Water Pumps	Yes	19,539	6.0	0	$3,263	$16,700	$1,500	$15,200	4.7	19,675
ECM 8	Install VFDs on Kitchen Hood Fan Motors	Yes	2,544	0.1	12	$593	$5,100	$200	$4,900	8.3	4,018
Unitary HVAC Measures			**348,063**	**304.7**	**0**	**$58,130**	**$1,319,700**	**$68,100**	**$1,251,600**	**21.5**	**350,497**
ECM 9	Install High Efficiency Air Conditioning Units	No	118,451	127.1	0	$19,782	$939,500	$53,300	$886,200	44.8	119,279
ECM 10	Install High Efficiency Heat Pumps	Yes	229,612	177.6	0	$38,347	$380,200	$14,800	$365,400	9.5	231,217
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**552**	**$7,442**	**$302,900**	**$0**	**$302,900**	**40.7**	**64,588**
ECM 11	Install High Efficiency Hot Water Boilers	No	0	0.0	552	$7,442	$302,900	$0	$302,900	40.7	64,588
HVAC System Improvements			**13,030**	**0.0**	**159**	**$4,325**	**$26,700**	**$30**	**$26,670**	**6.2**	**31,772**
ECM 12	Implement Demand Control Ventilation (DCV)	Yes	13,030	0.0	150	$4,200	$26,500	$0	$26,500	6.3	30,691
ECM 13	Install Pipe Insulation	Yes	0	0.0	9	$125	$200	$30	$170	1.4	1,081
Domestic Water Heating Upgrade			**0**	**0.0**	**74**	**$1,003**	**$3,080**	**$780**	**$2,300**	**2.3**	**8,707**
ECM 14	Install Low-Flow DHW Devices	Yes	0	0.0	74	$1,003	$3,080	$780	$2,300	2.3	8,707
Food Service & Refrigeration Measures			**40,210**	**3.8**	**0**	**$6,715**	**$56,940**	**$2,940**	**$54,000**	**8.0**	**40,491**
ECM 15	Dishwasher Replacement	Yes	14,143	1.6	0	$2,362	$10,800	$700	$10,100	4.3	14,242
ECM 16	Refrigerator/Freezer Case Electrically Commutated Motors	Yes	3,513	0.4	0	$587	$5,240	$560	$4,680	8.0	3,538
ECM 17	Refrigeration Controls	Yes	8,504	0.2	0	$1,420	$14,280	$630	$13,650	9.6	8,563
ECM 18	Replace Refrigeration Equipment	No	8,186	0.9	0	$1,367	$25,000	$900	$24,100	17.6	8,243
ECM 19	Vending Machine Control	Yes	5,863	0.7	0	$979	$1,620	$150	$1,470	1.5	5,904
Custom Measures* **			**-59,086**	**0.0**	**630**	**-$1,369**	**$17,400**	**$0**	**$17,400**	**-12.7**	**14,266**
ECM 20	Replace Gas Fired Water Heater with Heat Pump Water Heater***	No	-59,086	0.0	630	-$1,369	$17,400	$0	$17,400	-12.7	14,266
TOTALS			**1,285,288**	**547.6**	**1,272**	**$231,811**	**$2,470,480**	**$206,250**	**$2,264,230**	**9.8**	**1,443,184**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

*** - Negative payback explained in section 4.9

All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**769,763**	**191.1**	**-136**	**$126,718**	**$559,860**	**$88,370**	**$471,490**	**3.7**	**759,180**
ECM 1	Install LED Fixtures	158,873	39.6	-9	$26,409	$218,220	$16,670	$201,550	7.6	158,903
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,029	0.5	0	$333	$1,390	$130	$1,260	3.8	1,994
ECM 3	Retrofit Fixtures with LED Lamps	608,861	150.9	-127	$99,976	$340,250	$71,570	$268,680	2.7	598,284
Lighting Control Measures		**93,618**	**21.1**	**-20**	**$15,371**	**$82,500**	**$35,530**	**$46,970**	**3.1**	**91,980**
ECM 4	Install Occupancy Sensor Lighting Controls	41,947	11.4	-9	$6,887	$37,410	$4,260	$33,150	4.8	41,214
ECM 5	Install High/Low Lighting Controls	51,670	9.6	-11	$8,484	$45,090	$31,270	$13,820	1.6	50,766
Variable Frequency Drive (VFD) Measures		**79,690**	**27.0**	**12**	**$13,477**	**$101,400**	**$10,500**	**$90,900**	**6.7**	**81,703**
ECM 6	Install VFDs on Constant Volume (CV) Fans	57,607	20.9	0	$9,621	$79,600	$8,800	$70,800	7.4	58,010
ECM 7	Install VFDs on Chilled Water Pumps	19,539	6.0	0	$3,263	$16,700	$1,500	$15,200	4.7	19,675
ECM 8	Install VFDs on Kitchen Hood Fan Motors	2,544	0.1	12	$593	$5,100	$200	$4,900	8.3	4,018
Unitary HVAC Measures		**229,612**	**177.6**	**0**	**$38,347**	**$380,200**	**$14,800**	**$365,400**	**9.5**	**231,217**
ECM 10	Install High Efficiency Heat Pumps	229,612	177.6	0	$38,347	$380,200	$14,800	$365,400	9.5	231,217
HVAC System Improvements		**13,030**	**0.0**	**159**	**$4,325**	**$26,700**	**$30**	**$26,670**	**6.2**	**31,772**
ECM 12	Implement Demand Control Ventilation (DCV)	13,030	0.0	150	$4,200	$26,500	$0	$26,500	6.3	30,691
ECM 13	Install Pipe Insulation	0	0.0	9	$125	$200	$30	$170	1.4	1,081
Domestic Water Heating Upgrade		**0**	**0.0**	**74**	**$1,003**	**$3,080**	**$780**	**$2,300**	**2.3**	**8,707**
ECM 14	Install Low-Flow DHW Devices	0	0.0	74	$1,003	$3,080	$780	$2,300	2.3	8,707
Food Service & Refrigeration Measures		**32,024**	**2.9**	**0**	**$5,348**	**$31,940**	**$2,040**	**$29,900**	**5.6**	**32,248**
ECM 15	Dishwasher Replacement	14,143	1.6	0	$2,362	$10,800	$700	$10,100	4.3	14,242
ECM 16	Refrigerator/Freezer Case Electrically Commutated Motors	3,513	0.4	0	$587	$5,240	$560	$4,680	8.0	3,538
ECM 17	Refrigeration Controls	8,504	0.2	0	$1,420	$14,280	$630	$13,650	9.6	8,563
ECM 19	Vending Machine Control	5,863	0.7	0	$979	$1,620	$150	$1,470	1.5	5,904
TOTALS		**1,217,736**	**419.6**	**90**	**$204,589**	**$1,185,680**	**$152,050**	**$1,033,630**	**5.1**	**1,236,807**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

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 ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**769,763**	**191.1**	**-136**	**$126,718**	**$559,860**	**$88,370**	**$471,490**	**3.7**	**759,180**
ECM 1	Install LED Fixtures	158,873	39.6	-9	$26,409	$218,220	$16,670	$201,550	7.6	158,903
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	2,029	0.5	0	$333	$1,390	$130	$1,260	3.8	1,994
ECM 3	Retrofit Fixtures with LED Lamps	608,861	150.9	-127	$99,976	$340,250	$71,570	$268,680	2.7	598,284

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 is 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, or incandescent 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 fixtures.

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: stadium lights, stage, theater, classroom, and exterior fixtures

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

The measure uses the existing fixture housing but replaces the electric components with more efficient lighting technology, which use less power than other lighting technologies but provides equivalent lighting output. Maintenance savings may also be achieved since LED tubes last longer than fluorescent tubes and, therefore, do not need to be replaced as often.

Affected Building Areas: locations with T-12 fluorescent lamps, including office-faculty 202 HS 9-/10, locker room boys HS 11/12, locker room girls HS 11/12

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent, or 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. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

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 (both linear and U-bend types), exterior incandescent lamps, classroom A11 wood shops HS 11/12, classroom E17 HS 11/12, locker room girl gym HS 11/12, areas with CFLs include classrooms, offices, restrooms, kitchens, corridors, theatres, and office press boxes.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**93,618**	**21.1**	**-20**	**$15,371**	**$82,500**	**$35,530**	**$46,970**	**3.1**	**91,980**
ECM 4	Install Occupancy Sensor Lighting Controls	41,947	11.4	-9	$6,887	$37,410	$4,260	$33,150	4.8	41,214
ECM 5	Install High/Low Lighting Controls	51,670	9.6	-11	$8,484	$45,090	$31,270	$13,820	1.6	50,766

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 4: 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, locker rooms, dining room, restrooms, and storage rooms

ECM 5: 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 considered when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

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 occupants approach the area.

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

Affected Building Areas: corridors, and stairwells

4.3 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**79,690**	**27.0**	**12**	**$13,477**	**$101,400**	**$10,500**	**$90,900**	**6.7**	**81,703**
ECM 6	Install VFDs on Constant Volume (CV) Fans	57,607	20.9	0	$9,621	$79,600	$8,800	$70,800	7.4	58,010
ECM 7	Install VFDs on Chilled Water Pumps	19,539	6.0	0	$3,263	$16,700	$1,500	$15,200	4.7	19,675
ECM 8	Install VFDs on Kitchen Hood Fan Motors	2,544	0.1	12	$593	$5,100	$200	$4,900	8.3	4,018

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: core building: RTU, AHU 1A, 1B, 2A, 2B, 3Aand 3B; 9-10 building: AHU mechanical room; 11/12 Building: AHU server room, RTUs 1, 3, 16, and 14

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: chilled water pump for theatre

ECM 8: Install VFDs on Kitchen Hood Fan Motors

Install VFDs and sensors to control the kitchen hood fan motors. 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.

4.4 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**348,063**	**304.7**	**0**	**$58,130**	**$1,319,700**	**$68,100**	**$1,251,600**	**21.5**	**350,497**
ECM 9	Install High Efficiency Air Conditioning Units	118,451	127.1	0	$19,782	$939,500	$53,300	$886,200	44.8	119,279
ECM 10	Install High Efficiency Heat Pumps	229,612	177.6	0	$38,347	$380,200	$14,800	$365,400	9.5	231,217

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 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 air conditioner is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: 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 and heating load, and the estimated annual operating hours.

Affected Units: multiple package units and split condensing units

Location	Area(s)/System(s) Served	Qty	Cooling-Tons	Manufacturer /Model
Exterior 2 HS 9 -10	Offices	1	2.50	York
Exterior 2 HS 9 -10	Offices	1	3.00	
Exterior 2 HS 9 -10	Server room	1	3.50	Fujitsu
Exterior 2 HS 9 -10	Server room	1	5.00	McQuay
Exterior Rooftop HS 9 -10	9-10 Building office- CU 1	1	10.00	Lennox
Exterior Rooftop HS 9 -10	Principal Office	1	7.50	
Exterior Rooftop Core Building	Kitchen Core building	2	3.00	York
Exterior Rooftop Core Building	Core Building	1	12.50	Trane
Exterior Rooftop Core Building	Core Building	2	2.00	EMI
Exterior Rooftop Core Building	Core Building	1	5.00	York
Rooftop C block HS 11-12	Girls Locker Room Old and New	2	0.75	EMI
Rooftop HS 11-12	11-12 Building- RTU 1	1	12.50	York
Rooftop HS 11-12	11-12 Building- RTU 8	1	7.50	York
Rooftop HS 11-12	RTU 4	1	7.50	York
Rooftop HS 11-12	RTU 3	1	10.00	
Rooftop HS 11-12	11-12 Building	1	7.50	
Rooftop HS 11-12	RTU 7	1	7.50	York
Rooftop C block HS 11-12	RTU 30	1	7.50	York
Exterior Rooftop Gym hall HS 11-12	RTU 24	1	15.00	Aaon
Exterior Rooftop Gym hall HS 11-12	RTU 26	1	5.00	York

Location	Area(s)/System(s) Served	Qty	Cooling-Tons	Manufacturer /Model
Exterior Rooftop Gym hall HS 11-12	Auditorium RTU	1	60.00	Aaon
Exterior Rooftop Gym hall HS 11-12	RTU 16	1	10.00	York
Exterior Rooftop Gym hall HS 11-12	RTU 17	1	7.50	York
Exterior Rooftop Gym hall HS 11-12	11-12 Building	1	13.00	Aaon
Exterior Rooftop Gym hall HS 11-12	RTU 18-19-22-23 Gym Area	4	25.00	York
Rooftop HS 11-12	RTU 2- 36	2	3.00	York
Rooftop C Block HS 11-12	11-12 Building C block	1	15.00	Aaon
Exterior Rooftop F HS 11-12	Classroom- Condensing Units	11	3.00	York
Exterior Rooftop F HS 11-12	Classroom- Condensing Units	12	3.50	York
Exterior Rooftop Gym hall HS 11-12	Classroom- Condensing Units	1	2.00	EMI
Exterior Rooftop Gym hall HS 11-12	Classroom- Condensing Units	1	2.00	EMI
Exterior Rooftop Gym hall HS 11-12	Classroom- Condensing Units	2	3.00	York
Exterior Rooftop Gym hall HS 11-12	Classroom- Condensing Units	4	3.50	York
Rooftop HS 11-12	Classroom- Condensing Unit 79	1	1.50	York
Rooftop HS 11-12	Classroom- Condensing Unit 52-48	2	3.50	York
Rooftop HS 11-12	Classroom- Condensing Unit 16	1	3.00	York
Rooftop HS 11-12	Classroom- Condensing Unit 15 and 8	2	3.50	York
Rooftop HS 11-12	Condensing Unit 53-49-50-54-51	5	3.50	York
Rooftop HS 11-12	Condensing Unit 70	1	2.50	York
Rooftop HS 11-12	Classroom- Condensing Unit 18	1	3.00	York
Rooftop HS 11-12	Classroom- Condensing Units 22	1	3.50	York
Rooftop HS 11-12	Condensing Units 7-14-13-5-4-3-2-1-9	9	3.50	York
Rooftop HS 11-12	Classroom- Condensing Unit 6-12-11-10	4	3.00	York
Rooftop C Block HS 11-12	Classroom- Condensing Units -7	1	3.00	York
Rooftop C Block HS 11-12	Classroom- Condensing Units	2	3.00	York
Rooftop C Block HS 11-12	Classroom- Condensing Units	6	3.50	York

ECM 10: 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: multiple classrooms air source and water source heat pump

Area(s)/System(s) Served	System Type	Cooling Capacity-Tons	Manufacturer
Office Faculty	Water Source HP	4.00	EDPAC
Classroom K111	Split-System Air-Source HP	4.00	Airedale
Classroom I109	Split-System Air-Source HP	4.00	Airedale
Classroom H110A	Water Source HP	6.00	EDPAC
Classroom H110B	Water Source HP	4.00	EDPAC
Classroom H111A	Water Source HP	6.00	EDPAC
Classroom I-103	Water Source HP	3.00	Airedale
Classroom I-105	Water Source HP	3.00	Airedale
Classroom I-106	Split-System Air-Source HP	4.00	Airedale
Classroom I-110	Split-System Air-Source HP	4.00	Airedale
Classroom I-111	Split-System Air-Source HP	4.00	Airedale
Classroom I-112	Split-System Air-Source HP	4.00	Airedale
Classroom J-106 A	Water Source HP	6.00	EDPAC
Classroom J-106 B	Water Source HP	6.00	EDPAC
Classroom J-107	Water Source HP	4.00	EDPAC
Classroom J-108	Water Source HP	5.00	EDPAC
Classroom J-109	Water Source HP	5.00	EDPAC
Classroom K 103	Water Source HP	5.00	EDPAC
Classroom K 105	Split-System Air-Source HP	4.00	Airedale
Classroom K 106	Split-System Air-Source HP	4.00	Airedale
Classroom K 109	Split-System Air-Source HP	4.00	Airedale
Classroom K 110	Split-System Air-Source HP	4.00	Airedale
Classroom K 112	Split-System Air-Source HP	4.00	Airedale
Classroom L 105	Split-System Air-Source HP	4.00	Airedale
Classroom L 106	Split-System Air-Source HP	4.00	Airedale
Classroom L 109	Split-System Air-Source HP	4.00	Airedale
Classroom L 110	Split-System Air-Source HP	4.00	Airedale
Classroom L 111	Split-System Air-Source HP	4.00	Airedale
Classroom L 112	Split-System Air-Source HP	4.00	Airedale
Classroom I205	Split-System Air-Source HP	4.00	Airedale
Classroom I208	Split-System Air-Source HP	4.00	Airedale
Classroom I209	Split-System Air-Source HP	4.00	Airedale
Classroom I210	Split-System Air-Source HP	4.00	Airedale
Classroom I211	Split-System Air-Source HP	4.00	Airedale

Area(s)/System(s) Served	System Type	Cooling Capacity-Tons	Manufacturer
Classroom I212	Water Source HP	4.00	EDPAC
Office - Faculty J202 B	Water Source HP	4.00	EDPAC
Classroom J 207	Water Source HP	4.00	EDPAC
Classroom J 209	Water Source HP	4.00	EDPAC
Classroom J 212	Water Source HP	4.00	EDPAC
Classroom J 213	Water Source HP	4.00	EDPAC

4.5 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**552**	**$7,442**	**$302,900**	**$0**	**$302,900**	**40.7**	**64,588**
ECM 11	Install High Efficiency Hot Water Boilers	0	0.0	552	$7,442	$302,900	$0	$302,900	40.7	64,588

ECM 11: Install High Efficiency Hot Water Boilers

We evaluated replacing older inefficient hot water boilers with high efficiency condensing hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is to employ condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F. Condensing hydronic boilers have been evaluated based on the assumption that the return water temperature can be reduced to less than 130°F during most of the operating hours. Adjusting the hot water loop temperature may require adjustments to airside HVAC equipment and should be part of a comprehensive operational efficiency effort.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load. In many cases installing multiple modular boilers, rather than one or two large boilers, will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers have reached the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

Affected Units: core building Bryan boilers

4.6 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**13,030**	**0.0**	**159**	**$4,325**	**$26,700**	**$30**	**$26,670**	**6.2**	**31,772**
ECM 12	Implement Demand Control Ventilation (DCV)	13,030	0.0	150	$4,200	$26,500	$0	$26,500	6.3	30,691
ECM 13	Install Pipe Insulation	0	0.0	9	$125	$200	$30	$170	1.4	1,081

ECM 12: Implement Demand Control Ventilation (DCV)

Demand control ventilation (DCV) is a control strategy that monitors the indoor air's carbon dioxide (CO2) 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. Implementation of this measure is dependent upon having a building automation system (BAS) or other smart building control system connected to the space conditioning equipment serving the noted areas.

Affected Building Areas: gymnasium areas of 9/10 and 11/12 buildings, auditorium in 11/12 building, and the theatre (core building).

ECM 13: Install Pipe Insulation

Install insulation on domestic hot water system piping. Distribution system thermal losses are dependent on system fluid temperature, the size of the distribution system, and the extent and condition of piping insulation. When the insulation has been damaged due to exposure to water, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated, system thermal efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Affected Systems: domestic hot water piping electric storage tank 9/10 building

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**74**	**$1,003**	**$3,080**	**$780**	**$2,300**	**2.3**	**8,707**
ECM 14	Install Low-Flow DHW Devices	0	0.0	74	$1,003	$3,080	$780	$2,300	2.3	8,707

ECM 14: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low-flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing.

4.8 Food Service and Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**40,210**	**3.8**	**0**	**$6,715**	**$56,940**	**$2,940**	**$54,000**	**8.0**	**40,491**
ECM 15	Dishwasher Replacement	14,143	1.6	0	$2,362	$10,800	$700	$10,100	4.3	14,242
ECM 16	Refrigerator/Freezer Case Electrically Commutated Motors	3,513	0.4	0	$587	$5,240	$560	$4,680	8.0	3,538
ECM 17	Refrigeration Controls	8,504	0.2	0	$1,420	$14,280	$630	$13,650	9.6	8,563
ECM 18	Replace Refrigeration Equipment	8,186	0.9	0	$1,367	$25,000	$900	$24,100	17.6	8,243
ECM 19	Vending Machine Control	5,863	0.7	0	$979	$1,620	$150	$1,470	1.5	5,904

ECM 15: Dishwasher Replacement

Replace existing Hobart door type dishwasher with new energy-efficient door type dishwasher. New high efficiency models often use an average of 40% less energy and water, compared to current standard efficiency equipment.

ECM 16: Refrigerator/Freezer Case Electrically Commutated Motors

Replace permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in cooler and freezer. 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.

Affected Systems: walk-in coolers and freezers

ECM 17: 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 de-frost 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.

Affected Systems: walk-in coolers and freezers

ECM 18: Replace Refrigeration Equipment

We evaluated replacing older existing commercial refrigerators, and the Scotsman ice maker with new ENERGY STAR rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

ECM 19: 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 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.

4.9 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**-59,086**	**0.0**	**630**	**-$1,369**	**$17,400**	**$0**	**$17,400**	**-12.7**	**14,266**
ECM 20	Replace Gas Fired Water Heater with Heat Pump Water Heater***	-59,086	0.0	630	-$1,369	$17,400	$0	$17,400	-12.7	14,266

ECM 20: Replace Gas Fired Water Heater with Heat Pump Water Heater

We evaluated replacing existing the gas water heaters with heat pump water heaters (HPWH).

A gas fired water heater uses a burner to heat water. Air source heat pump water heaters use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. Water heater efficiency is rated by the uniform energy factor (UEF). For a relative comparison of water heater UEFs, the criteria for certifying a water heater in the ENERGY STAR program are provided below. These values indicate that HPWH heaters are significantly more efficient than gas fired water heaters.

There are two types of HPWH: those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The measure considers an integrated HPWH.

ENERGY STAR Uniform Energy Factor (UEF) Criteria for Certified Water Heaters *

Water Heater Type	*Minimum UEF*	*Other*
Integrated HPWH	3.3	
Integrated HPWH	2.2	120 Volt, 15 Amp circuit
Split System HPWH	2.2	
Gas Fired Storage	0.64	≤ 55 gal, Medium Draw Pattern
Gas Fired Storage	0.68	≤ 55 gal, High Draw Pattern
Gas Fired Storage	0.78	> 55 gal, Medium Draw Pattern
Gas Fired Storage	0.80	> 55 gal, High Draw Pattern
Gas Fired Storage	0.80	Residential Duty
Gas Fired Instantaneous	0.87	

** Note: Uniform Energy Factor (UEF): The newest measure of water heater overall efficiency. The higher the UEF value is, the more efficient the water heater. UEF is determined by the Department of Energy's test method outlined in 10 CFR Part 430, Subpart B, Appendix E.[6]*

[6] https://www.energy.gov/sites/prod/files/2014/06/f17/rwh_tp_final_rule.pdf

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation[7]. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room. The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

Switching from a gas fired water heater to a HPWH has the potential to reduce the sites overall greenhouse gas emissions. If the electricity for the HPWH is provided by an on-site photovoltaic (PV) system then there are essentially no greenhouse gas (GHG) emissions. A 2016 study conducted at Cornell[8] calculated the kg of methane (CH_4) and carbon dioxide (CO_2) produced per GJ of water heated. The study compared HPWH to gas and electric fired, storage and tankless water heaters. The study also considered electricity produced from natural gas and coal fired electric plants. In all cases the study found that HPWHs produced less methane than all of the other water heaters. The study also found that HPWH produced less carbon dioxide than electric resistance water heaters but more carbon dioxide than tankless gas water heaters and about the same amount of carbon dioxide as storage gas water heaters. The summary tables provide the reduction in CO2 equivalent emissions based on the typical New Jersey electric utility.

This measure has a negative simple payback due to the relative cost of electricity to natural gas. At this site the cost per Btu for natural gas is significantly lower than for electricity. Therefore, even though this measure will result in a net energy savings in terms of Btu at this site it will increase the overall cost for providing domestic hot water.

Affected Units: 9/10 building-storage tank heater (Bradford white and Lochinvar), 11/12 building-Bradford white storage tank gas heater, and core building-Bradford white storage tank gas heater

4.10 Measures for Future Consideration

There are additional opportunities for improvement that Washington Township BOE may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment, and/or include significant system reconfiguration. These measure(s) are therefore beyond the scope of this energy audit. These measure(s) are described here to support a whole building approach to energy efficiency and sustainability.

---

[7] https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system

[8] Greenhouse gas emissions from domestic hot water: Heat pumps compared to most commonly used systems. Bongghi Hong, Robert W. Howarth. Department of Ecology and Evolutionary Biology, Cornell University. Energy Science and Engineering 2016.

Washington Township BOE may wish to consider the Energy Savings Improvement Program (ESIP) or other whole building approach. With interest in implementing comprehensive, largescale and/or complex system wide projects, these measures may be pursued during development of a future energy savings plan. We recommend that you work with your energy service company (ESCO) and/or design team to:

- Evaluate these measures further.
- Develop firm costs.
- Determine measure savings.
- Prepare detailed implementation plans.

Other modernization or capital improvement funds may be leveraged for these types of refurbishments. As you plan for capital upgrades, be sure to consider the energy impact of the building systems and controls being specified.

Retro-Commissioning Study

Due to the complexity of today's HVAC systems and controls, a thorough analysis and rebalance of heating, ventilation, and cooling systems should periodically be conducted. There are indications at this site that systems may not be operating correctly or as efficiently as they could be. One important tool available to building operators to ensure proper system operation is retro-commissioning.

Retro-commissioning is a common practice recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to be implemented every few years. We recommend that you contact a reputable engineering firm that specializes in energy control systems and retro-commissioning. Ask them to propose a scope of work and an outline of the procedures and processes to be implemented, including a schedule and the roles of all responsible parties.

Once goals and responsibilities are established, the objective of the investigation process is to understand how the building is currently operating, identify the issues, and determine the most cost-effective way to improve performance. The retro-commissioning agent will review building documentation, interview building occupants, and inspect and test the equipment. Information is then compiled into a report and shared with facility staff, who will select which recommendations to implement after reviewing the findings.

The implementation phase puts the selected processes into place. Typical measures may include sensor calibration, equipment schedule changes, damper linkage repair and similar relatively low-cost adjustments—although more expensive sophisticated programming and building control system upgrades may be warranted. Approved measures may be implemented by the agent, the building staff, or by subcontractors. Typically, a combination of these individuals makes up the retro-commissioning team.

After the approved measures are implemented, the team will verify that the changes are working as expected. Baseline and post-case measurements will allow building staff to monitor equipment and ensure that the benefits are maintained.

Electric Sub Metering

Electricity use varies in different facilities, and plant operators need to perform their own investigations and analyses to understand how their facilities consume energy. Utility bills indicate how much energy a facility uses across the entire facility, but submetering provides more detailed data on the energy consumption of specific systems and even on individual pieces of equipment, depending on how extensively meters are installed. Electric submeters alone do not save energy, but they are a useful tool under the right circumstances. Electric sub-meters can provide facility staff with real-time energy use data for specific buildings and systems, information that enhances the potential for greater energy management activities. Revenue grade submeters are a tool that allow operators to better understand how and where electricity is used at the facility. Better resolution of system energy use can lead to operational changes or even equipment modifications or replacement, which often result in reduced energy use, which often result in reduced energy use.

Upgrade to a Heat Pump System

Electric resistance heating units work by passing an electric current through wires to heat them. The system is 100% efficient since for every unit of electricity consumed, one unit of heat is produced.

But there is a way to convert electricity to create heat at better than a 1:1 ratio. Heat pumps operate on a more efficient principle, the refrigeration cycle. Instead of directly converting electricity to heat, electricity does the work, via a compressor, of moving refrigerant through a system that transfers heat from a cooler place to a warmer place. That system can move three to five as much energy as is available using electric resistance heating methods. Heat pumps work in a similar manner to an air conditioner, except they reverse the cooling process to circulate warm air instead of cold air. Also, heat pumps are generally capable of dispensing refrigerated air as they can typically be operated in air conditioning mode.

An electric furnace or boiler has no flue loss through a chimney. The AFUE rating for an all-electric furnace or boiler is between 95% and 100%. The lower values are for units installed outdoors because they have greater jacket heat loss. However, despite their high efficiency, the higher cost of electricity in most parts of the country makes all-electric furnaces or boilers an uneconomic choice. If you are interested in electric heating, consider installing a heat pump system.

Electric resistance heat, including electric furnaces and baseboard heaters, can be inexpensive to install but often expensive to run. Facilities with these systems can save substantial energy at a moderate cost by installing a heat pump when they replace a central air conditioner.

Even in buildings without central air-conditioning, there are opportunities to save energy when an existing electric furnace needs to be replaced, as well as opportunities to install ductless electric heat pumps in buildings with baseboard electric heaters and electric fan coils. Unit ventilators with built-in electric resistance heaters can be replaced with unit ventilators with integrated heat pumps.

Electric heat pumps have high coefficient of performance (COP) ratings and are substantially more efficient than traditional electric heating systems. Further investigation is required to determine whether installing a heat pump system is a cost-effective solution when replacing existing electrical heating systems.

VRF Systems

Consider variable refrigerant flow (VRF) systems as part of a comprehensive package unit upgrade project. (VRF systems use direct expansion (DX) heat pumps to transport heat between an outdoor condensing unit and a network of indoor evaporators, located near or within the conditioned space, through refrigerant piping installed in the building. Attributes that distinguish VRF from other DX system types are:

- Multiple indoor units connected to a common outdoor unit.
- Scalability
- Variable capacity
- Distributed control
- Simultaneous heating and cooling capability

VRF provides flexibility by allowing for many different indoor units (with different capacities and configurations), individual zone control, the unique ability to offer simultaneous heating and cooling in separate zones on a common refrigerant circuit, and heat recovery from one zone to another. VRF systems are equipped with at least one variable-speed and/or variable-capacity compressor.

To match the building's load profiles, energy is transferred from one indoor space to another through the refrigerant line, and only one energy source is necessary to provide both heating and cooling. VRF systems also operate efficiently at part load because of the compressor's variable capacity control. VRF systems are ideal for applications with varying loads or where zoning is required. Some other advantages of VRF systems include consistent comfort, quiet operation, energy efficiency, installation flexibility, zoned heating and cooling, state-of-the-art controls, and reliability.

VRF systems are more expensive than conventional heat pump systems; however, the higher initial cost can be offset by improved cooling efficiency during part load operation—a SEER (cooling) rating of 18.0 is not uncommon for small packaged VRF-equipped heat pumps.

When you are replacing packaged HVAC equipment, we recommend a comprehensive approach. Work with your contractor or design engineer to make sure your systems are sized and zoned according to current space configurations and occupancy. Select high efficiency equipment and controls that match your heating and cooling needs. Commission the system and controls to ensure proper operation, comfort, ventilation, and energy use.

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.

Operation and maintenance (O&M) plans enhance the operational efficiency of HVAC and other energy intensive systems and could save 5% –20% of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, and planned capital upgrades, and it incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and outline procedures for measuring and reporting whether goals have been achieved.

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 cannot manage what you do not 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[9]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single-pane windows and east- or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

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.

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

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.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly. Adjust exterior lighting time clock controls seasonally as needed to match your lighting requirements.

Motor Controls

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Whenever possible, use automatic devices such as twist timers or occupancy sensors to turn off motors when they are not needed.

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.

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

Economizer Maintenance

Economizers can significantly reduce cooling system load. A malfunctioning economizer can increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air. Common economizer malfunctions include broken outdoor thermostat or enthalpy control or dampers that are stuck or improperly adjusted.

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position.

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.

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.

Ductwork Maintenance

Duct maintenance has two primary goals: keep the ducts clean to avoid air quality problems and seal leaks to save energy. Check for cleanliness, obstructions that block airflow, water damage, and leaks. Ducts should be inspected at least every two years.

The biggest symptoms of clogged air ducts are differing temperatures throughout the building and areas with limited airflow from supply registers. If a particular air duct is clogged, then air flow will only be cut off to some rooms in the building—not all of them. The reduced airflow will make it more difficult for those areas to reach the temperature setpoint, which will cause the HVAC system to run longer to cool or heat that area properly. If you suspect clogged air ducts, ensure that all areas in front of supply registers are clear of items that may block or restrict air flow, and you should check for fire dampers or balancing dampers that have failed closed.

Duct leakage in commercial buildings can account for 5%–25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Check ductwork for leakage. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Distribution system losses are dependent on air system temperature, the size of the distribution system, and the level of insulation of the ductwork. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is missing or worn, the system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

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 and efficiently. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the boiler tubes to improve heat transfer.

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.

Optimize HVAC Equipment Schedules

Energy management systems (BAS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The BAS monitors and reports operational status, schedules equipment start and stop times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These BAS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your BAS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the optimal start feature of the BAS (if available) to optimize the building warmup sequence. Most BAS scheduling programs provide for holiday schedules, which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function, which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

Water Heater Maintenance

The lower the supply water temperature that is used for hand washing sinks, the less energy is needed to heat the water. Reducing the temperature results in energy savings and the change is often unnoticeable to users. Be sure to review the domestic water temperature requirements for sterilizers and dishwashers as you investigate reducing the supply water temperature.

Also, 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.

Compressed Air System Maintenance

Compressed air systems require periodic maintenance to operate at peak efficiency. A maintenance plan for compressed air systems should include:

- Inspection, cleaning, and replacement of inlet filter cartridges.
- Cleaning of drain traps.
- Daily inspection of lubricant levels to reduce unwanted friction.
- Inspection of belt condition and tension.
- Check for leaks and adjust loose connections.
- Overall system cleaning.
- Reduce pressure setting to minimum needed for air operated equipment.
- Turn off compressor if not routinely needed.
- Use low pressure blower air rather than high pressure compressed air.

Contact a qualified technician for help with setting up periodic maintenance schedule.

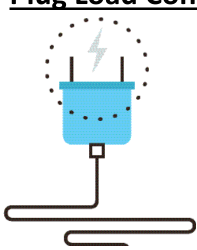
Refrigeration Equipment Maintenance

Preventative maintenance keeps commercial refrigeration equipment running reliably and efficiently. Commercial refrigerators and freezers are mission-critical equipment that can cost a fortune when they go down. Even when they appear to be working properly, refrigeration units can be consuming too much energy. Have walk-in refrigeration and freezer and other commercial systems serviced at least annually. This practice will allow systems to perform to their highest capabilities and will help identify system issues if they exist.

Maintaining your commercial refrigeration equipment can save between five and ten percent on energy costs. When condenser coils are dirty, your commercial refrigerators and freezers work harder to maintain the temperature inside. Worn gaskets, hinges, door handles or faulty seals cause cold air to leak from the unit, forcing the unit to run longer and use more electricity.

Regular cleaning and maintenance also help your commercial refrigeration equipment to last longer.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[10]. Your local utility may offer incentives or rebates for this equipment.

Procurement Strategies

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

[10] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

6 Water Best Practices

Getting Started

The commercial and institutional sector is the second largest consumer of publicly supplied water in the United States, accounting for 17% of the withdrawals from public water supplies[11]. In New Jersey, excluding water used for power generation, approximately 80% of total water use was attributed to potable supply during the period of 2009 to 2018. Water withdrawals for potable supply have not changed noticeably during the period from 1990 to 2018[12].

Water management planning serves as the foundation for any successful water reduction effort. It is the first step a commercial or institutional facility owner or manager should take to achieve and sustain long-term water savings. Understanding how water is used within a facility is critical for the water management planning process. A water assessment provides a comprehensive account of all known water uses at the facility. It allows the water management team to establish a baseline from which progress and program success can be measured. It also enables the water management team to set achievable goals and identify and prioritize specific projects based on the relative savings opportunities and project cost-effectiveness.

Water conservation devices may significantly reduce your water and sewer usage costs. Any reduction in water use reduces grid-level electricity use since a significant amount of electricity is used to treat and deliver water from reservoirs to end users.

For more information regarding water conservation or additional details regarding the practices shown below go to the EPA's WaterSense website[13] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[14] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Leak Detection and Repair

Identifying and repairing leaks and other water use anomalies within a facility's water distribution system or from processes or equipment can keep a facility from wasting significant quantities of water. Examples of common leaks include leaking toilets and faucets, drip irrigation malfunctions, stuck float valves, and broken distribution lines. Reading meters, installing failure abatement technologies, and conducting visual and auditory inspections are important best practices to detect leaks. Train building occupants, employees, and visitors to report any leaks that they detect. To reduce unnecessary water loss, detected leaks should be repaired quickly. Repairing leaks in water distribution that is pressurized by on-site pumps or in heated or chilled water piping will also reduce energy use.

Toilets and Urinals

Toilets and urinals are considered sanitary fixtures and are found in most facilities. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously flushing, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment

---

[11] Estimated from analyzing data in: Solley, Wayne B,. et al, "Estimated Use of Water in the United States in 1995", U.S Geological Survey Circular 1200, (1998)

[12] https://dep.nj.gov/wp-content/uploads/dsr/trends-water-supply.pdf

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

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

and the frequency of use, it may be cost effective to replace older inefficient fixtures with current generation WaterSense labeled equipment.

Commercial facilities typically use tank toilets or wall-mount flushometers. Educate and inform users with restroom signage and other means to avoid flushing inappropriate objects. For tank toilets, periodically check to ensure fill valves are working properly and that water level is set correctly. Annually test toilets to ensure the flappers are not worn or allowing water to seep from the tank into the bowl and down the sewer. Control stops and piston valves on flushometer toilets should be checked at least annually.

Most urinals use water to flush liquid. These standard single-user fixtures are present in most facilities. Non-water urinals use a specially designed trap that allows liquid waste to drain out of the fixture through a trap seal, and into the drainage system. Flushing urinals should be inspected at least annually for proper valve and sensor operation. For non-water urinals, follow maintenance practices as directed by the manufacturer to ensure products perform as expected. Non-water urinals can be considered during urinal replacement, however, review the condition and design of the existing plumbing system and the expected usage patterns to ensure that these products will provide the anticipated performance.

Faucets and Showerheads

Faucets and showerheads are sanitary fixtures that generally dispense heated water. Reducing water use by these fixtures translates into a reduction of site fuel or electric use depending on how water is heated. High efficiency fixtures are at least 20% more efficient than available standard products. Leaking or damaged equipment is a substantial source of water waste. Train users to report continuously dripping, leaking, or otherwise improperly operating equipment to the appropriate personnel. Depending on the age of the equipment and the frequency of use, it may be cost effective to replace older fixtures with current generation WaterSense labeled equipment.

Faucets are used for a variety of purposes, and standard flow rates are dictated by the intended use. Public use lavatory faucets and kitchen faucets are subject to maximum flow rates while service sinks are not. Periodically inspect faucet aerators for scale buildup to ensure flow is not being restricted. Clean or replace the aerator or other spout end device as needed. Check and adjust automatic sensors (where installed) to ensure they are operating properly to avoid faucets running longer than necessary. Post materials in restrooms and kitchens to ensure user awareness of the facility's water-efficiency goals. Remind users to turn off the tap when they are done and to consider turning the tap off during sanitation activities when it is not being used. Consider installing lavatory and kitchen faucet fixtures with reduced flow. Federal standards limit kitchen and restroom faucet flows to 2.2 gpm. To qualify for a WaterSense label a faucet cannot exceed 1.5 gpm.

Effective in 1992, the maximum allowable flow rate for all showerheads sold in the United States is 2.5 gpm. Since this standard was enacted, many showerheads have been designed to use even less water. WaterSense labeled equipment is designed to use 2.0 gpm, or less. For optimum showerhead efficiency, the system pressure should be tested to make sure that it is between 20 and 80 pounds per square inch (psi). Verify that plumbing lines are routed through a shower valve to prevent water pressure fluctuations. Periodically inspect showerheads for scale buildup to ensure flow is not being restricted. In general, replace showerheads with 2.5 gpm flow rates or higher with WaterSense labeled models. Note: Use of poor performing replacement reduced flow showerheads may result in increased use if the duration of use is increased to compensate for reduced performance. WaterSense labeled showerheads are independently certified to meet or exceed minimum performance requirements for spray coverage and force.

Commercial Kitchen Equipment

Commercial and institutional sectors, including hospitals, offices, and schools, have substantial kitchen water use. Water in food service is used for steam cooking, spray/flow cleaning, dish washing, and ice making. In most commercial kitchens, the commercial dishwasher and pre-rinse spray valve account for over two-thirds of the water use. Newer technologies and better practices are available that can significantly reduce commercial kitchen equipment water and energy use. For example, ENERGY STAR qualified dishwashers and steam cookers are at least 10% more water-efficient and 15% more energy-efficient than standard models. With some models saving significantly more.

Cooking equipment includes combination ovens, steam cookers, and steam kettles. For efficient steam cooking operation, fill vessels to capacity when possible, set temperatures optimally for the process, and keep doors and lids closed while cooking. Replace gaskets to ensure proper sealing and repair leaks. When replacing combination ovens, select connectionless equipment; replace steam cookers with ENERGY STAR rated steam cookers.

Spray/flow cleaning equipment includes dipper wells, pre-rinse spray valves, food disposals, and wash down sprayers. Turn off water when service periods are slow and keep flow rates to minimum level. Train users to scrape food rather than rely on water pressure. Inspect for leaks and scaling. Test system pressure to ensure it is between 20 and 80 pounds per square inch (psi) for optimum flow and performance of spray equipment. For dipper wells, consider installing in-line flow restrictors to reduce flow. Pre-rinse spray valves can be replaced with new assemblies which use 1.3 gpm or less. Washdown sprayers can be equipped with self-closing nozzles or consider mopping/sweeping as an alternative.

Dishwashers range in type and include undercounter, stationary/hood, conveyor, and flight-type models. Only run dishwashers when they are full and fill racks to maximum capacity. Be sure to replace damaged dishwasher racks. Educate staff to scrape dishes prior to loading. Ensure that final rinse pressure and water temperature are within the manufacturer's recommendations. Operate the dishwasher close to or at the minimum flow rate and set rinse cycle time to the manufacturer's minimum recommended settings. Make sure that manual fill valves close completely after the wash tank is filled. Find and repair any leaks. Inspect valves and rinse nozzles for proper operation and repair worn nozzles. Look for ENERGY STAR qualified models when purchasing or leasing a new commercial dishwasher or replacing an existing unit. Consider your kitchen throughput to select an appropriately sized commercial dishwasher since an oversized dishwasher will waste water if the machine is not loaded to capacity.

Ice Machines

Commercial ice machines use refrigeration units to freeze water into ice. Ice machines typically use water for two purposes: cooling the refrigeration unit and making ice. Because the ice-making process generates a significant amount of heat, either water or air is used to remove this waste heat from the ice machine's refrigeration unit.

Water-cooled ice machines generally pass water through the machine once to cool it and then dispose of the single-pass water down the drain. Water-cooled systems can use less water by recirculating the cooling water through a chiller or a cooling tower to lower the temperature, returning the water to the machine for reuse. To eliminate using water to cool the refrigeration unit altogether, air can be used to cool the unit. Air-cooled ice machines use motor-driven fans or centrifugal blowers to move air through the refrigeration unit to remove heat. In general, water-cooled units are more energy efficient than air-cooled units but use more water. Commercial ice machines that are ENERGY STAR qualified are, on average, 15% more energy-efficient and 10% more water-efficient than standard air-cooled models.

For optimal ice machine efficiency, consider the following:

- Clean the ice machine to remove lime and scale buildup; sanitize it to kill bacteria and fungi. Run the self-cleaning sequence if available. For machines without a self-cleaning mode, shut down the machine, empty the bin of ice, add cleaning or sanitizing solution to the machine, switch it to cleaning mode, and then switch it to ice production mode. For health and safety purposes, create and discard several batches of ice to remove residual cleaning solution.
- Keep the ice machine's coils clean to ensure the heat exchange process is running efficiently.
- Keep the lid closed to preserve cool air and maintain the appropriate temperature.
- Install a timer to shift ice production to off-peak hours to decrease peak energy demand.
- Work with the manufacturer to ensure that the ice machine's rinse cycle is set to the lowest possible frequency that still provides sufficient ice quality and meets local water quality and site requirements.
- Follow the manufacturer's use and care instructions for the specific ice machine model.
- Train users to report leaking or otherwise improperly operating ice machines to the appropriate personnel.

If the machine is cooled using single-pass water, modify the machine to operate on a closed loop that recirculates the cooling water through a cooling tower or heat exchanger, if possible.

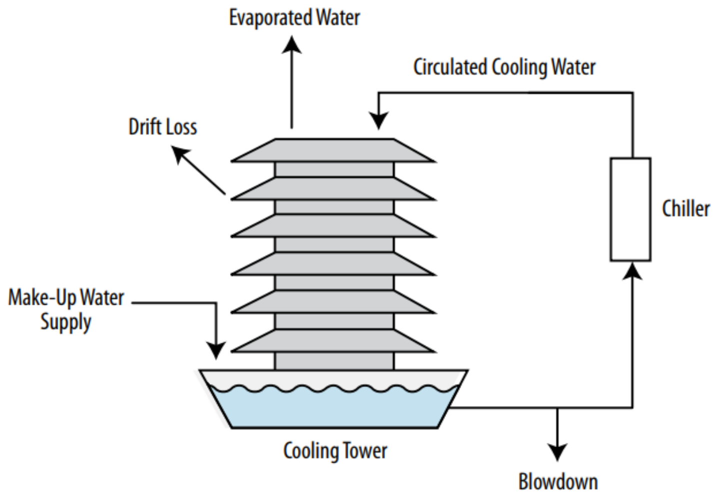
When replacing an ice machine or installing a new one, ensure that the new model is sized appropriately to fit the facility's need. Choose an ice machine that is appropriate for the quality of ice needed. Producing ice of higher quality than required will use water unnecessarily. Look for ENERGY STAR qualified models, all of which are air-cooled. Also consider air- or water-cooled ice machines that meet the efficiency specifications outlined by the Consortium for Energy Efficiency. If feasible, consider selecting air-cooled flake or nugget ice machines, which use less water and energy than cubed ice machines.

Cooling Towers

Cooling towers dissipate heat from recirculating water used to cool chillers, air conditioning equipment, or other process equipment. By design, they use significant amounts of water. However, facilities can save substantial amounts of water by optimizing the operation and maintenance of cooling tower systems.

Evaporation is the primary function of the tower and is the method that transfers heat from the cooling tower system to the environment. Tower water evaporation is not typically targeted for water-efficiency efforts because it is fundamental to the cooling process. However, improving the energy efficiency of the systems that use the cooling water will reduce the evaporative load on the tower. The rate of evaporation from a cooling tower is typically equal to approximately one percent of the rate of recirculating water flow for every 10°F in temperature drop that the cooling tower achieves.

The main water loss in a cooling tower system is due to blowdown. When water evaporates from the tower, dissolved solids (e.g., calcium, magnesium, chloride, silica) are left behind. As more water evaporates, the concentration of total dissolved solids (TDS) increases. If the concentration gets too high, the TDS can cause scale to form within the system or can lead to corrosion. The concentration of TDS is controlled by removing (i.e., bleeding or blowing down) a portion of the water that has high TDS concentration and replacing that water with make-up water, which has a lower concentration of TDS. Water can also be lost to "drift." Drift is water that is carried away from the tower as mist or small droplets. Drift can vary from 0.05 to 0.2% of the flow rate through the cooling tower. Properly operated towers and associated piping should not have leaks or overflows. However, an overflow drain is provided within the tower in case of malfunction and subsequent overflow.



Cooling Tower System

A key parameter used to evaluate cooling tower operation is cycles of concentration (sometimes referred to as "cycles" or "concentration ratio"). Cycles of concentration is the ratio of the concentration of TDS (i.e., conductivity) in the blowdown water divided by the conductivity of the make-up water. Since TDS enter the system in the make-up water and exit the system in the blowdown water, the cycles of concentration are also approximately equal to the ratio of volume of make-up water to blowdown water. See the figure below.

Cycles of Concentration (Cycles) = Blowdown Conductivity (ppm of TDS) / Make-up Conductivity (ppm of TDS)

Cycles of Concentration (Cycles) = Make-up water gal / Blowdown Water gal

Cycles of Concentration

To use water efficiently in the cooling tower system, the cycles must be maximized. This is accomplished by minimizing the amount of blowdown required, thus reducing make-up water demand. The degree to which the cycles can be maximized depends on the water chemistry within the cooling tower and the water chemistry of the make-up water supply. As the cycles are increased, the amount of TDS that stays within the system also increases. If the cycles calculated based on gallons of make-up water and blowdown are more than 10% higher than the value calculated using conductivity that can indicate that the tower is losing water due to leaks, overflow, or excess drift.

For optimum cooling tower water efficiency, there are several operations, maintenance, and user education strategies to consider.

- Implement energy-efficiency measures to reduce the heat load to the tower which will reduce the cooling tower water use.
- Implement a comprehensive air handler coil maintenance program to reduce the load on the chilled water system.
- Properly maintain and clean heat exchangers, condensers, and evaporator coils to prevent scale, biological growth, and sediment from building up in the tubes.
- If available, have operations and maintenance personnel read the conductivity, make-up, and blowdown flow meters regularly to identify problems and determine when to adjust.

- Keep a detailed log of make-up and blowdown quantities, conductivity, and cycles of concentration and monitor trends to spot deterioration in performance.
- Make sure the tower fill valve cuts off cleanly when the tower basin is full to minimize wasted water from leaks.
- Calculate and understand the cooling tower's cycles. Check the ratio of make-up water to blowdown water. Then check the ratio of blowdown and make-up conductivity. These ratios should match the target cycles. If both ratios are not about the same, check the tower for leaks. If the tower is not maintaining target cycles, check the conductivity controller, the make-up water valve, and the blowdown valve for proper operation.
- Maximize the cycles of concentration. Many systems operate at two to four cycles of concentration, while six cycles or more might be possible.

	New Cycles of Concentration										
Initial Cycles of Concentration	2	2.5	3	3.5	4	5	6	7	8	9	10
1.5	33%	44%	50%	53%	56%	58%	60%	61%	62%	63%	64%
2.0	--	17%	25%	30%	33%	38%	40%	42%	43%	44%	45%
2.5	--	--	10%	16%	20%	25%	28%	30%	31%	33%	34%
3.0	--	--	--	7%	11%	17%	20%	22%	24%	25%	26%
3.5	--	--	--	--	5%	11%	14%	17%	18%	20%	21%
4.0	--	--	--	--	--	6%	10%	13%	14%	16%	17%
5.0	--	--	--	--	--	--	4%	7%	9%	10%	11%
6.0	--	--	--	--	--	--	--	3%	5%	6%	7%

Make-up Water % Saved by Increasing Cycles of Concentration

There are also retrofits to consider if the cooling tower system is not already equipped with these items.

- Install flow meters on the make-up and blowdown water lines.
- Install conductivity meters or purchase a handheld meter to take conductivity measurements.
- Install a conductivity controller to automatically control blowdown.
- Install an automated chemical feed system for towers over 100-ton capacity. The chemical feed system will monitor conductivity, control blowdown, and add chemicals based on make-up water flow.

Consider reusing "wastewater" from other systems as make-up water for the cooling tower. One good source is the condensate from large cooling coils. This reuse is particularly appropriate because the condensate has a low mineral content and is generated in greatest quantities when cooling tower loads are the highest. Work with the water treatment vendor to ensure that the alternative sources identified are a good match for the cooling tower.

Contact the water utility to determine if the facility can receive a sanitary sewer charge deduction associated with the potable water lost to evaporation. If the utility agrees to provide this deduction, calculate the difference between the city-supplied potable make-up water and the blowdown water that is discharged to the sanitary sewer to determine how much cooling tower water is evaporating rather than being discharged to the sewer.

Landscaping and Irrigation

Most facilities that own or maintain surrounding landscape will have outdoor water use. The amount of outdoor water use is dictated by the size and design of the landscape and the need for supplemental irrigation. Studies show that average landscape water use in the institutional sector can range from 7% of total water use for hospitals, 22% for office buildings, and up to 30% for schools.

Proper landscape design can help minimize outdoor water use. Regionally appropriate plant choices, healthy soils with appropriate grading, the use of mulches, and limiting the use of high water-using plants such as turfgrass can significantly reduce the need for supplemental irrigation. In addition, proper design, installation, and maintenance of irrigation equipment can have a dramatic impact on outdoor water use.

- Retain a landscape professional certified in water-efficient landscaping.
- Maintain soil quality by applying mulch, soil amendments, and good topsoil.
- Maintain existing plants by manually pulling weeds, raising the blade on mowers, and including shaded areas in the overall landscape design.
- Minimize water used for hardscape cleaning and use recycled or reclaimed water where applicable, especially in water features.

Irrigation system optimization combines efficient irrigation practices with efficient technologies and can be complex. Irrigation professionals who are properly educated on water-efficient practices can help ensure that existing irrigation systems are efficiently operated and properly maintained. In general, plan for or adjust irrigation systems to prevent over (or under) watering.

- Improve distribution uniformity so water is evenly applied over the landscape.
- Irrigation schedules should be updated based on changing weather conditions.
- In general, apply water in larger amounts, but less frequently, resulting in deep watering.
- If a dedicated landscape water meter is installed, incorporate an outdoor water budget.
- Routinely look for leaks, overwatering, or overspray.
- Require a full irrigation system audit every 3 years by a qualified irrigation auditor.
- Consider drip irrigation systems for plant beds as they can reduce irrigation water use by 20% to 50% as compared to traditional sprinklers.
- More efficient sprinkler heads can reduce irrigation water use by 30%.
- Smart irrigation controllers can schedule irrigation based on weather data or on-site conditions, reducing irrigation water use by 15% compared to manual or clock timer irrigation systems.

7 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.

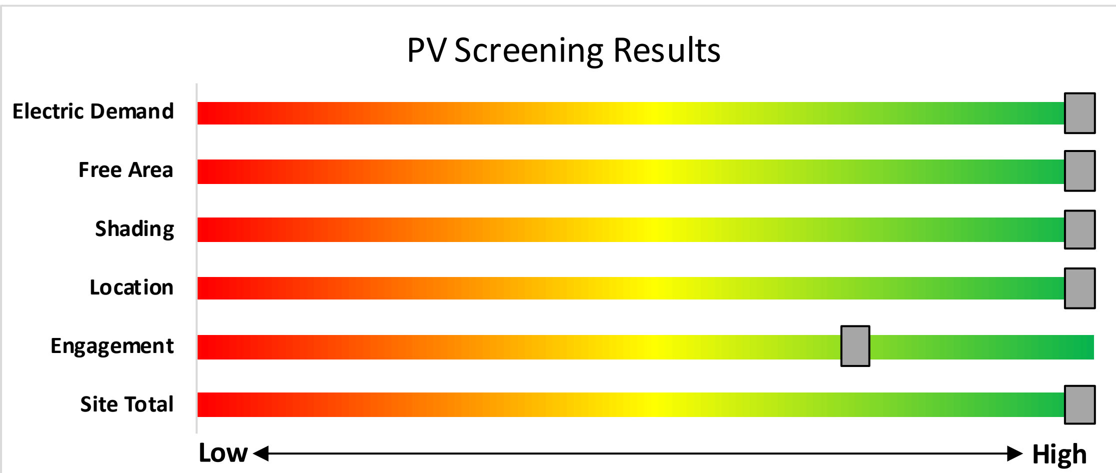
7.1 Solar Photovoltaic

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 high potential for installing a PV array.

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the high potential. A PV array located on the roof 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.



Potential	High	
System Potential	1,746	kW DC STC
Electric Generation	2,080,132	kWh/yr
Displaced Cost	$347,400	/yr
Installed Cost	$4,539,600	

Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects. Solar projects may qualify to earn SREC- IIs (Solar Renewable Energy Certificates-II), however, the project owners must register their solar projects prior to the start of construction to establish the project's eligibility.

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:

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

7.2 Combined Heat and Power

Combined heat and power (CHP) generate 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.

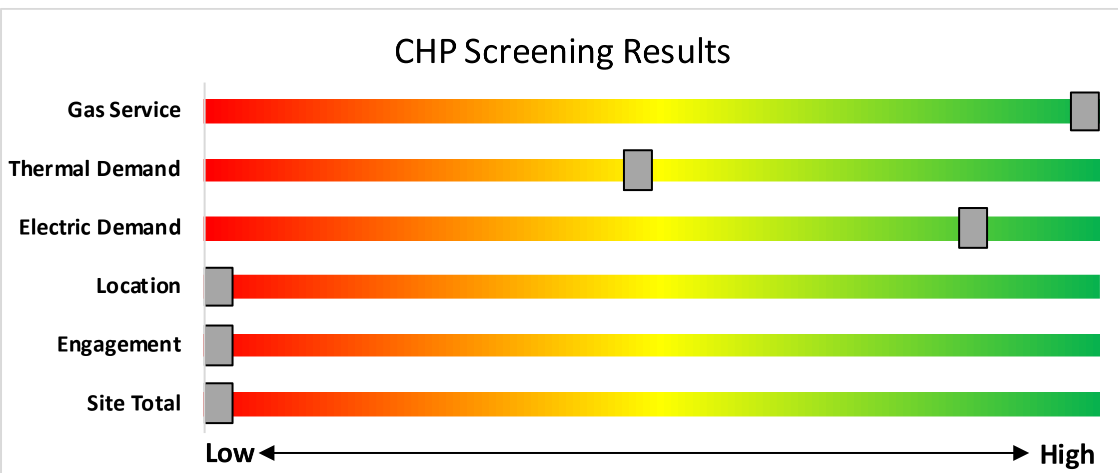
CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be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



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/

8 Electric Vehicles

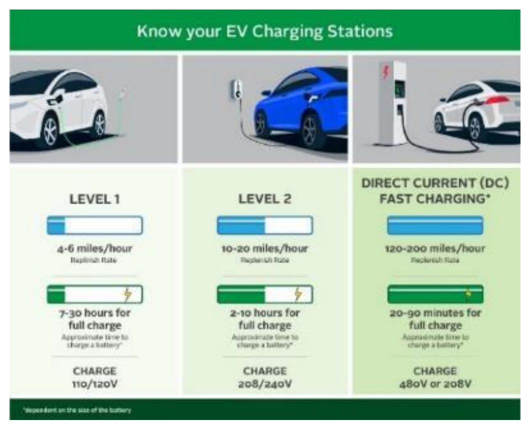
All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or tailpipe emissions.

EVs are typically more expensive than similar conventional and hybrid vehicles, although some cost can be recovered through fuel savings, federal tax credit, or state incentives

8.1 EV Charging

EV charging stations provide a means for electric vehicle operators to recharge their batteries at a facility. While many EV drivers charge at home, others do not have access to regular home charging, and the ability to charge at work or in public locations is critical to making EVs practical for more drivers. Charging can also be used for electric fleet vehicles, which can reduce fuel and maintenance costs for fleets that replace gas or diesel vehicles with EVs.

EV charging comes in three main types. For this assessment, the screening considers addition of Level 2 charging, which is most common at workplaces and other public locations. Depending on the site type and usage, other levels of charging power may be more appropriate.



The preliminary assessment of EV charging at the facility shows that there is medium potential for adding EV chargers to the facility's parking, based on potential costs of installation and other site factors.

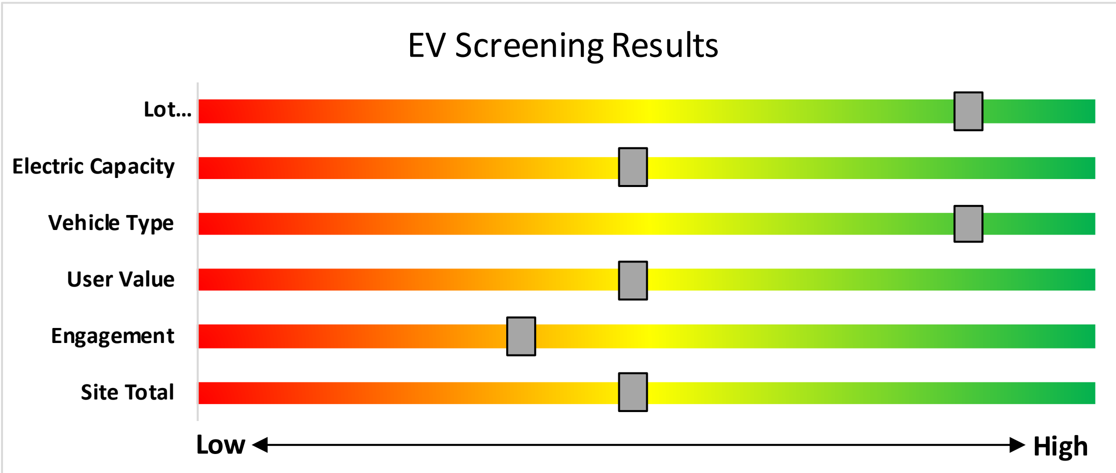
The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

The type and size of the parking area impact the costs and feasibility of adding EV charging. Parking structure installations can be less costly than surface lot installations as power may be readily available, and equipment and wiring can be surface mounted. Parking lot installations often require trenching through concrete or asphalt surface. Large parking areas provide greater flexibility in charger siting than smaller lots.

The location and capacity of facility electric panels also impact charger installation costs. A Level 2 charger generally requires a dedicated 208-240V, 40 Amp circuit. The electric panel nearest the planned installation may not have available capacity and may need to be upgraded to serve new EV charging loads. Alternatively, chargers could be powered from a more distant panel. The distance from the panel to the location of charging stations ties directly to costs, as conduits, cables, and potential trenching costs all increase on a per-foot basis. The more charging stations planned, the more likely it is that additional electrical capacity will be needed.

Other factors to consider when planning for EV charging at a facility include who the intended users are, how long they park vehicles at the site, and whether they will need to pay for the electricity they use.

The graphic below displays the results of the EV charging assessment conducted as part of this audit. The position of each slider indicates the impact each factor has on the feasibility of installing EV charging at the site.



EV Charger Screening

Electric Vehicle Programs Available

New Jersey is leading the way on electric vehicle (EV) adoption on the East Coast. There are several programs designed to encourage EV adoption in New Jersey, which is crucial to reaching a 100% clean energy future.

NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE), Public Service Electric and Gas Company (PSE&G) or Jersey Central Power and Light (JCP&L), may be eligible for additional electric vehicle charging incentives directly from the utility. Projects may be eligible for both the incentives offered by this BPU program and incentives offered by ACE, PSE&G or JCP&L, up to 90% of the combined charger purchase and installation costs. Please check ACE, PSE&G or JCP&L program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

EV Charging incentive information is available from Atlantic City Electric, PSE&G and JCP&L.For more information and to keep up to date on all EV programs please visit https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs

9 Project Funding and Incentives

Ready to improve your building's performance? New Jersey's Clean Energy Programs and Utility Energy Efficiency Programs can help. Pick the program that works best for you. This section provides an overview of currently available incentive programs in New Jersey.

NJBPU and NJCEP Administered Programs

- New Construction (residential, commercial, industrial, government)
- Large Energy Users
- Energy Savings Improvement Program (financing)
- State Facilities Initiative*
- Local Government Energy Audits
- Combined Heat & Power & Fuel Cells

*State facilities are also eligible for utility programs

Utility Administered Programs

- Existing buildings (residential, commercial, industrial, government)
- Efficient Products
  - Lighting & Marketplace
  - HVAC
  - Appliance Rebates
  - Appliance Recycling

9.1 New Jersey's Clean Energy Program

Save money while saving the planet! New Jersey's Clean Energy Program is a statewide program that offers incentives, programs, and services that benefit New Jersey residents, businesses, educational, non-profit, and government entities to help them save energy, money, and the environment.

Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers. To qualify entities must have incurred at least $5 million in total energy costs in the prior fiscal year.

Incentives

Incentives are based on the specifications below. The maximum incentive per entity is the lesser of:

- $4 million
- 75% of the total project(s) cost
- 90% of total NJCEP fund contribution in previous year
- $0.33 per projected kWh saved; $3.75 per projected Therm saved annually

How to Participate

To participate in LEUP, you will first need submit an enrollment application. This program requires all qualified and approved applicants to submit an energy plan that outlines the proposed energy efficiency work for review and approval. Applicants may submit a Draft Energy Efficiency Plan (DEEP), or a Final Energy Efficiency Plan (FEEP). Once the FEEP is approved, the proposed work can begin.

Detailed program descriptions, instructions for applying, and applications can be found at http://www.njcleanenergy.com/LEUP.

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[15]

Eligible Technology	Size (Installed Rated Capacity)	Incentive ($/Watt)[5]	% of Total Cost Cap per Project	$ Cap per Project
CHPs powered by non-renewable or renewable fuel source, or a combination:[4] - Gas Internal Combustion Engine - Gas Combustion Turbine - Microturbine Fuel Cells ≥60%	≤500 kW[1]	$2.00	30-40%[2]	$2 million
	>500 kW - 1 MW[1]	$1.00		
	> 1 MW - 3 MW[1]	$0.55	30%	$3 million
	>3 MW[1]	$0.35		
Fuel Cells ≥40%	Same as above[1]	Applicable amount above	30%	$1 million
Waste Heat to Power (WHP)[3] Powered by non-renewable fuel source. Heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine)	≤1MW[1]	$1.00	30%	$2 million
	> 1MW[1]	$.50	30%	$3 million

15

1 Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive $2.00/watt for the first 500 kW, $1.00/watt for the second 500 kW, $0.55/watt for the next 2 MW and $0.35/watt for the last 1 MW (up to the caps listed).

2 The maximum incentive will be limited to 30% of total project. For CHP projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

3 Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum $ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

4 Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

5 CHP-FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

How to Participate

You will 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 http://www.njcleanenergy.com/CHP.

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The program is used to register and certify 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 SREC-IIs (Solar Renewable Energy Certificates-II). SuSI consists of two sub-programs. The Administratively Determined Incentive (ADI) Program and the Competitive Solar Incentive (CSI) Program.

Administratively Determined Incentive (ADI) Program

The ADI Program provides administratively set incentives for net metered residential projects, net metered non-residential projects 5 MW or less, and all community solar projects.

After the registration is accepted, construction is complete, and a complete final as-built packet has been submitted, the project is issued a New Jersey certification number, which enables it to generate New Jersey SREC- IIs.

Market Segments	Size MW dc	Incentive Value ($/SREC II)	Public Entities Incentive Value - $20 Adder ($/SRECII)
Net Metered Residential	All types and sizes	$90	N/A
Small Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects smaller than 1 MW	$100	$120
Large Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects 1 MW to 5 MW	$90	$110
Small Net Metered Non-Residential Ground Mount	Projects smaller than 1 MW	$85	$105
Large Net Metered Non-Residential Ground Mount	Projects 1 MW to 5 MW	$80	$100
LMI Community Solar	Up to 5 MW	$90	N/A
Non-LMI Community Solar	Up to 5 MW	$70	N/A
Interim Subsection (t)	All types and sizes	$100	N/A

Eligible projects may generate SREC-IIs for 15 years following the commencement of commercial operations which is defined as permission to operate (PTO) from the Electric Distribution Company. After 15 years, projects may be eligible for a NJ Class I REC.

SREC-IIs will be purchased monthly by the SREC-II Program Administrator who will allocate the SREC-IIs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year.

The ADI Program online portal is now open to new registrations.

Competitive Solar Incentive (CSI) Program

The CSI Program opened on April 15, 2023, and will serve as the permanent program within the SuSI Program providing incentives to larger solar facilities. The CSI Program is open to qualifying grid supply solar facilities, non-residential net metered solar installations with a capacity greater than five (5) megawatts ("MW"), and to eligible grid supply solar facilities installed in combination with energy storage.

CSI eligible facilities will only be allowed to register in the CSI program upon award of a bid pursuant to N.J.A.C. 14:8-11.10.

The CSI program structure has separate categories, or tranches, to ensure that a range of solar project types, including those on preferred sites, are able to participate despite potentially different project cost profiles. The Board has approved four tranches for grid supply and large net metered solar and an additional fifth tranche for storage in combination with grid supply solar. The following table lists procurement targets for the first solicitation:

Tranche	Project Type	MW (dc) Targets
Tranche 1.	Basic Grid Supply	140
Tranche 2.	Grid Supply on the Built Environment	80
Tranche 3.	Grid Supply on Contaminated Sites and Landfills	40
Tranche 4.	Net Metered Non- Residential	40
Tranche 5.	*Storage Paired with Grid	160 MWh

*The storage tranche of 160 MWh corresponds to a 4-hour storage pairing of 40 MW of solar

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan.

If you are considering installing solar on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program

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 contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the energy conservation measures (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 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 descriptions 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.

Demand Response (DR) Energy Aggregator

Demand Response Energy Aggregator is a program designed to reduce the electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Grid operators call upon curtailment service providers and commercial facilities to reduce electric usage during times of peak demand, making the grid more reliable and reducing transmission costs for all ratepayers. Curtailment service providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary, and participants receive payments whether or not their facility is called upon to curtail its electric usage.

Typically, an electric customer must be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with greater capability to quickly curtail their demand during peak hours receive higher payments. Customers with back-up generators on site may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in DR programs often find it to be a valuable source of revenue for their facility, because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature setpoints on thermostats (so that air conditioning units run less frequently) or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company’s normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a DR activity in most situations.

The first step toward participation in a DR program is to contact a curtailment service provider. A list of these providers is available on the website of the independent system operator, PJM, and it includes contact information for each company, as well as the states where they have active business[16]. PJM also posts training materials for program members interested in specific rules and requirements regarding DR activity along with a variety of other DR program information[17].

Curtailment service providers typically offer free assessments to determine a facility’s eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility’s ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities, and they may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

[16] http://www.pjm.com/markets-and-operations/demand-response.aspx.

[17] http://www.pjm.com/training/training-events.aspx.

9.2 Utility Energy Efficiency Programs

The Clean Energy Act, signed into law by Governor Murphy in 2018, requires New Jersey's investor-owned gas and electric utilities to reduce their customers' use by set percentages over time. To help reach these targets the New Jersey Board of Public Utilities approved a comprehensive suite of energy efficiency programs to be run by the utility companies.

Prescriptive and Custom

The Prescriptive and Custom rebate program through your utility provider 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.

Equipment Examples

Lighting
Lighting Controls
HVAC Equipment
Refrigeration
Gas Heating
Gas Cooling
Commercial Kitchen Equipment
Food Service Equipment
Variable Frequency Drives
Electronically Commutate Motors
Variable Frequency Drives
Plug Loads Controls
Washers and Dryers
Agricultural
Water Heating

The Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type. The Custom program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives.

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 or less 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.

How to Participate

To participate in Direct Install, you will work with a participating contractor. 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 Direct Install program, subject to program rules and eligibility, while the remaining percent of the cost is paid to the contractor by the customer.

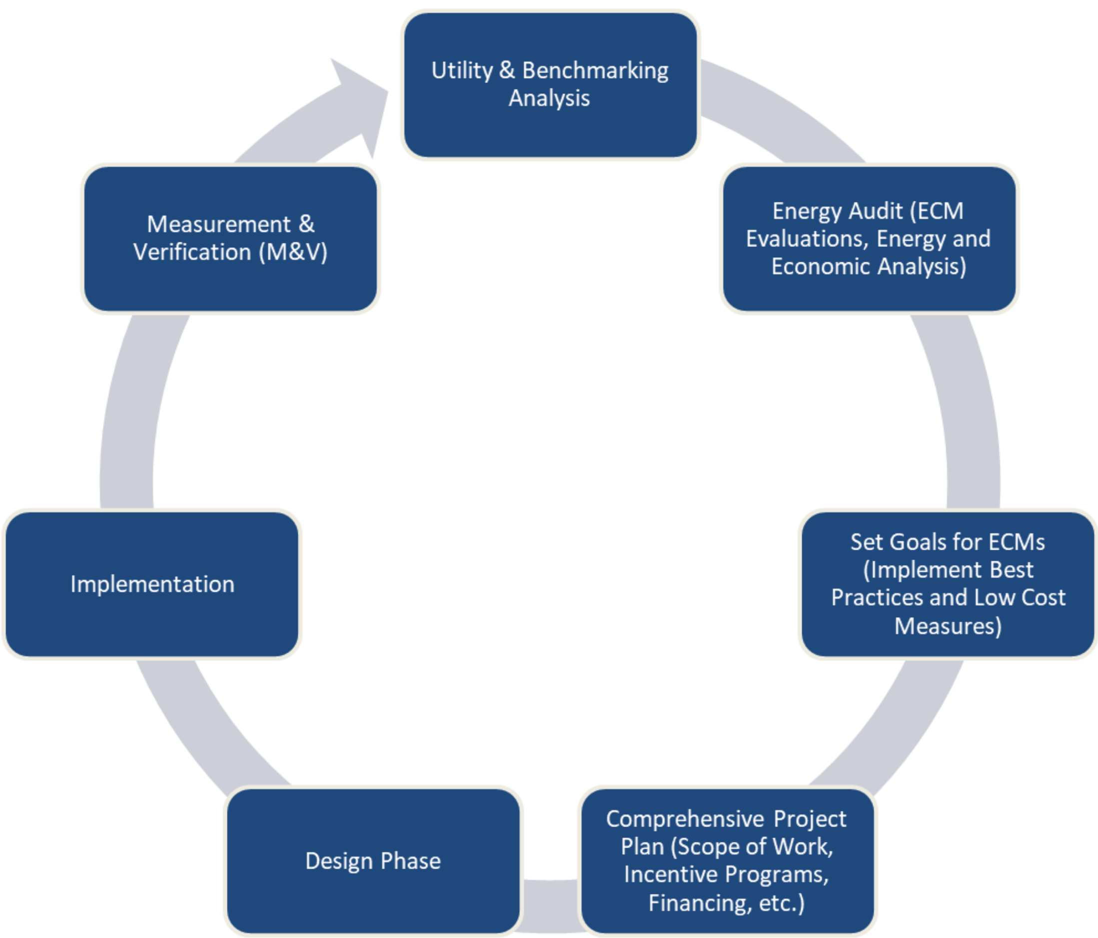
Engineered Solutions

The Engineered Solutions Program provides tailored energy-efficiency assistance and services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. Customers receive expert guided services, including investment-grade energy auditing, engineering design, installation assistance, construction administration, commissioning, and measurement and verification (M&V) services to support the implementation of cost-effective and comprehensive efficiency projects. Engineered Solutions is generally a good option for medium to large sized facilities with a peak demand over 200 kW looking to implement as many measures as possible under a single project to achieve deep energy savings. Engineered Solutions 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. Incentives for this program are based on project scope and energy savings achieved.

For more information on any of these programs, contact your local utility provider or visit https://www.njcleanenergy.com/transition.

10 Project Development

Energy conservation measures (ECMs) have been identified for your site, and their energy and economic analyses are provided within this LGEA report. Note that some of the identified projects may be mutually exclusive, such as replacing equipment versus upgrading motors or controls. The next steps with project development are to set goals and create a comprehensive project plan. The graphic below provides an overview of the process flow for a typical energy efficiency or renewable energy project. We recommend implementing as many ECMs as possible prior to undertaking a feasibility study for a renewable project. The cyclical nature of this process flow demonstrates the ongoing work required to continually improve building energy efficiency over time. If your building(s) scope of work is relatively simple to implement or small in scope, the measurement and verification (M&V) step may not be required. It should be noted through a typical project cycle, there will be changes in costs based on specific scopes of work, contractor selections, design considerations, construction, etc. The estimated costs provided throughout this LGEA report demonstrate the unburdened turn-key material and labor cost only. There will be contingencies and additional costs at the time of implementation. We recommend comprehensive project planning that includes the review of multiple bids for project work, incorporates potential operations and maintenance (O&M) cost savings, and maximizes your incentive potential.



Project Development Cycle

11 Energy Purchasing and Procurement Strategies

11.1 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. 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[18].

11.2 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 fluctuate monthly. The utility provides basic gas supply service 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[19].

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

[19] 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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom I201 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I202 HS 9 -10	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom I204 HS 9 -10	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom I205 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I208 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I209 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I210 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I211 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I212 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom H110 HS 9 -10	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	931	0	$153	$530	$120	2.7
Classroom H110 HS 9 -10	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.8	2,927	-1	$481	$1,620	$320	2.7
Classroom H111 HS 9 -10	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.6	2,378	0	$391	$1,310	$260	2.7
Classroom H111 HS 9 -10	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	621	0	$102	$350	$80	2.6
Classroom H112 HS 9 -10	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom H201 HS 9 -10	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom H202 HS 9 -10	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom H205 HS 9 -10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom H205 HS 9 -10	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom H206 HS 9 -10	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom H206 HS 9 -10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom I102 HS 9 -10	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.3	1,242	0	$204	$710	$160	2.7
Classroom I103 HS 9 -10	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom I105 HS 9 -10	19	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	19	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.8	2,949	-1	$484	$1,680	$380	2.7
Classroom I106 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I109 HS 9 -10	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,397	0	$229	$800	$180	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom I110 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I111 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom I113 HS 9-10	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	31	0	$5	$330	$40	57.1
Classroom I113 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom J106 HS 9-10	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	274	0	$45	$150	$30	2.7
Classroom J106 HS 9-10	21	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	21	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.8	3,260	-1	$535	$1,860	$420	2.7
Classroom J206 HS 9-10	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom J207 HS 9-10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom J209 HS 9-10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom J210 HS 9-10	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	20	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.8	3,105	-1	$510	$1,770	$400	2.7
Classroom J211 HS 9-10	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	91	0	$15	$50	$10	2.7
Classroom J211 HS 9-10	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom J212 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom J213 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K102 HS 9-10	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.3	1,242	0	$204	$710	$160	2.7
Classroom K103 HS 9-10	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom K105 HS 9-10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom K106 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K109 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K111 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K1110 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K112 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K201 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K202 HS 9-10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K204 HS 9-10	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom K205 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K208 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K209 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K210 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K211 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom K212 HS 9 -10	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	S	9	2,520		None	No	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom K212 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L102 HS 9 -10	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.3	1,242	0	$204	$710	$160	2.7
Classroom L103 HS 9 -10	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom L105 HS 9 -10	19	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	19	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.8	2,949	-1	$484	$1,680	$380	2.7
Classroom L106 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L109 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L110 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L111 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L112 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L201 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L202 HS 9 -10	16	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	16	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,484	-1	$408	$1,420	$320	2.7
Classroom L204 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L205 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L208 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L209 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L210 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L211 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom L212 HS 9 -10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Corridor K block 2nd HS 9 -10	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.1	5,469	-1	$898	$2,900	$1,100	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor 2nd floor HS 9 -10	13	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	13	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2nd floor HS 9 -10	60	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	60	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	3.2	16,406	-3	$2,694	$8,130	$3,300	1.8
Corridor First floor HS 9 -10	13	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	13	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor First floor HS 9 -10	59	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	59	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	3.1	16,132	-3	$2,649	$8,040	$3,250	1.8
Corridor First floor HS 9 -10	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,318	0.1	580	0	$95	$630	$180	4.7
Corridor First floor HS 9 -10	18	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 5	Relamp	Yes	18	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,318	0.5	2,610	-1	$429	$2,440	$810	3.8
Corridor Hblock HS 9 -10	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	14	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	0.7	3,828	-1	$629	$2,090	$770	2.1
Corridor Hblock HS 9 -10	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 5	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,318	0.1	580	0	$95	$630	$180	4.7
Corridor I block 2nd floor HS 9 -10	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.1	5,469	-1	$898	$2,900	$1,100	2.0
Corridor IBlock first HS 9 -10	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	24	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.3	6,562	-1	$1,077	$3,250	$1,320	1.8
Corridor k block HS 9 -10	25	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	25	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.3	6,836	-1	$1,122	$3,620	$1,380	2.0
Corridor L block HS 9 -10	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.1	5,469	-1	$898	$2,900	$1,100	2.0
Corridor L block 2nd HS 9 -10	20	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 5	Relamp	Yes	20	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	1,739	1.1	4,101	-1	$673	$2,900	$1,100	2.7
Dining Area cafe HS 9 -10	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Dining Area cafe HS 9 -10	78	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3, 4	Relamp	Yes	78	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	435	4.2	3,999	-1	$657	$8,880	$1,770	10.8
Electrical Room cafe HS 9 -10	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	4	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	630	0.1	80	0	$13	$350	$40	23.5
Elevator room HS 9 -10	1	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	630	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	630	0.0	5	0	$1	$30	$0	37.7
Gymnasium adaptive HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,880	0.0	209	0	$34	$100	$20	2.3
Gymnasium adaptive HS 9 -10	38	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,880	3, 4	Relamp	Yes	38	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,987	2.0	8,906	-2	$1,462	$4,350	$870	2.4
Gymnasium Regular HS 9 -10	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
Gymnasium Regular HS 9 -10	35	LED - Fixtures: High-Bay	Wall Switch	S	100	2,880	4	None	Yes	35	LED - Fixtures: High-Bay	Occupancy Sensor	100	1,987	0.8	3,437	-1	$564	$990	$110	1.6
Kitchen 1 HS 9 -10	54	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 4	Relamp	Yes	54	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,318	2.9	14,765	-3	$2,424	$6,100	$1,220	2.0
Kitchen 1 HS 9 -10	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,318	0.1	290	0	$48	$330	$40	6.1
Library 1 HS 9 -10	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
Library 1 HS 9 -10	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520		None	No	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,520	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Library 1 HS 9 -10	24	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	24	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.0	3,726	-1	$612	$2,120	$480	2.7
Library 1 HS 9 -10	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	1.4	5,537	-1	$909	$3,050	$610	2.7
Library 1 HS 9 -10	72	Linear Fluorescent - T8: 4' T8 (32W) - 8L	Wall Switch	S	228	2,520	3, 4	Relamp	Yes	72	LED - Linear Tubes: (8) 4' Lamps	Occupancy Sensor	116	1,739	7.7	29,530	-6	$4,849	$15,300	$3,060	2.5
Library 1 HS 9 -10	5	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3	Relamp	No	5	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,520	0.1	402	0	$66	$440	$50	5.9
Locker Room boys HS 9 -10	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
Locker Room boys HS 9 -10	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
Locker Room boys HS 9 -10	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	S	9	2,880		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room boys HS 9 -10	25	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,880	3	Relamp	No	25	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,880	1.0	4,435	-1	$728	$2,210	$500	2.3
Locker Room boys HS 9 -10	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,880	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,880	0.0	92	0	$15	$90	$10	5.3
Locker Room boys HS 9 -10	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,880	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,880	0.1	276	0	$45	$270	$30	5.3
Locker Room girls HS 9 -10	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
Locker Room girls HS 9 -10	22	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,880	3	Relamp	No	22	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,880	0.9	3,903	-1	$641	$1,950	$440	2.4
Locker Room girls HS 9 -10	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,880	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,880	0.0	92	0	$15	$90	$10	5.3
Locker Room girls HS 9 -10	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,880	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,880	0.1	276	0	$45	$270	$30	5.3
Locker Room H block girls HS 9 -10	9	Compact Fluorescent: (1) 26W Plug-In Lamp	Occupancy Sensor	S	26	2,880	3	Relamp	No	9	LED Lamps: LED Lamps	Occupancy Sensor	19	2,880	0.0	200	0	$33	$230	$10	6.7
Locker Room H block girls HS 9 -10	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,880	3	Relamp	No	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,880	0.3	1,242	0	$204	$620	$140	2.4
Locker Room H block girls HS 9 -10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,880	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,880	0.1	627	0	$103	$300	$60	2.3
Mechanical room HS 9 -10	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 4	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,318	0.4	1,862	0	$306	$940	$160	2.6
Nurse office HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	931	0	$153	$530	$120	2.7
Nurse office HS 9 - 10	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.1	241	0	$40	$270	$30	6.1
Office - English Supervisor Library HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	233	0	$38	$250	$40	5.5
Office - Faculty HS 9 -10	26	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	26	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.0	4,036	-1	$663	$2,300	$520	2.7
Office - Faculty 202 HS 9 -10	17	Linear Fluorescent - T12: 4' T12 (40W) - 1L	Occupancy Sensor	S	46	2,520	2	Relamp & Reballast	No	17	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,520	0.4	1,484	0	$244	$1,070	$90	4.0
Office - Faculty 202 HS 9 -10	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,520	0.0	80	0	$13	$90	$10	6.1
Office - K113 HS 9 - 10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office - L113 HS 9 - 10	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.6	2,256	0	$370	$1,300	$260	2.8
Office - Media Specialist Library HS 9 -10	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,739	0.2	652	0	$107	$860	$100	7.1
Office - Secretary Library HS 9 -10	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,739	0.1	435	0	$71	$680	$80	8.4
Office Workroom - Library HS 9 -10	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	466	0	$76	$530	$80	5.9
Restroom - female HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - female first HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - female L HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - feMale L 2nd HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male 1 HS 9 -10	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,890	0.0	121	0	$20	$180	$20	8.1
Restroom - Male 11 HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - Male 11 HS 9 -10	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.1	206	0	$34	$150	$30	3.6
Restroom - Male 3 HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male 5 HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male 5 (1) HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male first L HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - Male L 2nd HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Staff HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - Staff HS 9 -10	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	69	0	$11	$50	$10	3.6
Restroom - Staff make HS 9 -10	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.0	116	0	$19	$90	$20	3.7
Restroom - Staff make HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom -female HS 9 -10	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,890	0.0	121	0	$20	$180	$20	8.1
Restroom -female (1) HS 9 -10	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,890	0.0	121	0	$20	$180	$20	8.1
Server Room HS 9 - 10	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	776	0	$127	$440	$100	2.7
Server Room HS 9 - 10	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	161	0	$26	$180	$20	6.1
Stairs - I HS 9 -10	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch		29	8,760	5	None	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.0	433	0	$71	$280	$180	1.4

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Stairs H pod HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Stairs I pod HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Stairs I Pod HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Stairs k pod HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Stairs L pod HS 9 - 10	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Storage 104 HS 9 - 10	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	630	0.0	20	0	$3	$90	$10	24.2
Storage 3 HS 9 -10	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	23	0	$4	$50	$10	10.7
Storage 4 HS 9 -10	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	630	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	630	0.0	23	0	$4	$50	$10	10.7
Storage 6 HS 9 -10	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	630	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	630	0.1	78	0	$13	$180	$40	11.0
Storage H block HS 9 -10	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3, 4	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	435	0.4	410	0	$67	$1,040	$200	12.5
Storage Recieving HS 9 -10	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3, 4	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	435	0.2	204	0	$33	$680	$110	17.0
Exterior Lights	23	Halogen Incandescent: (1) 40W Plug-In Lamp	Photocell		40	4,380	3	Relamp	No	23	LED Lamps: (1) 18.5W Plug-In Lamp	Photocell	12	4,380	0.0	2,821	0	$471	$580	$20	1.2
Exterior Lights	56	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell		175	4,380		None	No	56	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	175	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Lights	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell		150	4,380		None	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	150	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Lights	33	Halogen Incandescent: (1) 50W Lamp	Photocell		50	50		None	No	33	Halogen Incandescent: (1) 50W Lamp	Photocell	50	50	0.0	0	0	$0	$0	$0	0.0
Exterior Lights	37	Metal Halide: (1) 400W Lamp	Photocell		458	4,380	1	Fixture Replacement	No	37	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Photocell	150	4,380	0.0	49,914	0	$8,336	$27,590	$3,700	2.9
Exterior Lights	63	Metal Halide: (1) 250W Lamp	Photocell		295	4,380	1	Fixture Replacement	No	63	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	100	4,380	0.0	53,808	0	$8,986	$42,200	$3,150	4.3
Exterior Lights	11	Mercury Vapor: (1) 400W Lamp	Photocell		455	400	1	Fixture Replacement	No	11	LED - Fixtures: Architectural Flood/Spot Luminaire	Photocell	150	400	0.0	1,342	0	$224	$7,230	$550	29.8
Classroom A10 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom A11 HS 11-12	39	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	39	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.9	3,568	-1	$586	$1,970	$390	2.7
Classroom A11 wood shops HS 11-12	3	Compact Fluorescent: (2) 25W Biaxial Plug-In Lamps	Wall Switch	S	50	2,520	3	Relamp	No	3	LED Lamps: LED Lamps	Wall Switch	35	2,520	0.0	125	0	$20	$110	$10	4.9
Classroom A11 wood shops HS 11-12	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
Classroom A11 wood shops HS 11-12	1	Incandescent: (1) 60W A21 Screw-In Lamp	Wall Switch	S	60	2,520	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	9	2,520	0.0	141	0	$23	$30	$0	1.3
Classroom A11 wood shops HS 11-12	5	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	5	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	39	0	$6	$330	$40	45.7
Classroom A11 wood shops HS 11-12	59	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,520	4	None	Yes	59	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.4	1,470	0	$241	$1,320	$140	4.9

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom A11 wood shops HS 11-12	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	161	0	$26	$180	$20	6.1
Classroom A11 wood shops second HS 11-12	31	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	31	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.7	2,836	-1	$466	$1,570	$310	2.7
Classroom A12 HS 11-12	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom A14 HS 11-12	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.5	1,863	0	$306	$1,060	$240	2.7
Classroom A16 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A18 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A26 HS 11-12	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	549	0	$90	$300	$60	2.7
Classroom A27 HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,921	0	$315	$1,060	$210	2.7
Classroom A28 HS 11-12	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.2	915	0	$150	$510	$100	2.7
Classroom A29 HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,921	0	$315	$1,060	$210	2.7
Classroom A30 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A31 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A32 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A33 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A34 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A35 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A36 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A37 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom A4 HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,921	0	$315	$1,060	$210	2.7
Classroom A4 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	310	0	$51	$180	$40	2.7
Classroom A7 electrical HS 11-12	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	2,520	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	2,520	0.0	19	0	$3	$30	$0	9.4
Classroom A8 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	183	0	$30	$100	$20	2.7
Classroom B16 HS 11-12	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.6	2,378	0	$391	$1,310	$260	2.7
Classroom B18 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom B18 (1) HS 11-12	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.2	823	0	$135	$460	$90	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom B19 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B2 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B20 HS 11-12	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	549	0	$90	$300	$60	2.7
Classroom B21 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B23 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B25 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B4 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom B6 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C11 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C13 HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,921	0	$315	$1,060	$210	2.7
Classroom C15 HS 11-12	25	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	25	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.0	3,881	-1	$637	$2,210	$500	2.7
Classroom C16 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C18 HS 11-12	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	18	2,520		None	No	1	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom C19 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom c2 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C20 HS 11-12	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	18	2,520		None	No	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom C20 HS 11-12	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	2,520		None	No	1	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom C201 HS 11-12	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	31	0	$5	$330	$40	57.1
Classroom C201 HS 11-12	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	457	0	$75	$250	$50	2.7
Classroom C201 HS 11-12	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom C21 Band room HS 11-12	5	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	2,520	3	Relamp	No	5	LED Lamps: LED Lamps	Wall Switch	19	2,520	0.0	97	0	$16	$130	$10	7.5
Classroom C21 Band room HS 11-12	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	23	0	$4	$330	$40	76.1
Classroom C21 Band room HS 11-12	29	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	29	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.2	4,502	-1	$739	$2,570	$580	2.7
Classroom C21 Band room HS 11-12	54	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	54	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	1.3	4,940	-1	$811	$2,730	$540	2.7
Classroom C21 Band room HS 11-12	33	High-Pressure Sodium: (1) 150W Lamp	Wall Switch	S	188	2,520	1	Fixture Replacement	No	33	LED - Fixtures: Architectural Flood/Spot Luminaire	Wall Switch	75	2,520	2.7	10,337	-2	$1,697	$21,690	$1,650	11.8

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom C22 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C24 boys HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	310	0	$51	$180	$40	2.7
Classroom c4 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom C9 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom child room HS 11-12	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	2,520	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	2,520	0.0	19	0	$3	$30	$0	9.4
Classroom child room HS 11-12	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom child room HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	183	0	$30	$100	$20	2.7
Classroom D1 HS 11-12	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	2,520	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	2,520	0.0	19	0	$3	$30	$0	9.4
Classroom D1 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	183	0	$30	$100	$20	2.7
Classroom D10 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom D11 HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,921	0	$315	$1,060	$210	2.7
Classroom D12 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom D14 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom D16 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom D18 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom D18 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	621	0	$102	$350	$80	2.6
Classroom D19 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom D2 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	91	0	$15	$50	$10	2.7
Classroom D3 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	183	0	$30	$100	$20	2.7
Classroom D4 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	91	0	$15	$50	$10	2.7
Classroom D5 HS 11-12	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.7	2,744	-1	$451	$1,520	$300	2.7
Classroom D6 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	366	0	$60	$200	$40	2.7
Classroom D7 HS 11-12	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.6	2,287	0	$375	$1,260	$250	2.7
Classroom D8 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom E1 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom E10 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom E11 HS 11-12	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.3	1,098	0	$180	$610	$120	2.7
Classroom E12 HS 11-12	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,464	0	$240	$810	$160	2.7
Classroom E13 HS 11-12	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.3	1,098	0	$180	$610	$120	2.7
Classroom E15 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	621	0	$102	$350	$80	2.6
Classroom E17 HS 11-12	1	Incandescent: (1) 60W A19 Screw-In Lamp	Wall Switch	S	60	2,520	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	9	2,520	0.0	141	0	$23	$30	$0	1.3
Classroom E17 HS 11-12	1	LED Lamps: (1) 18W A15 Screw-In Lamp	Occupancy Sensor	S	18	2,520		None	No	1	LED Lamps: (1) 18W A15 Screw-In Lamp	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom E17 HS 11-12	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	23	0	$4	$330	$40	76.1
Classroom E17 HS 11-12	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.1	4,191	-1	$688	$2,390	$540	2.7
Classroom E17 HS 11-12	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.1	241	0	$40	$270	$30	6.1
Classroom E2 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom E3 HS 11-12	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.5	1,830	0	$300	$1,010	$200	2.7
Classroom E6 HS 11-12	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	18	2,520		None	No	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom E8 HS 11-12	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	18	2,520		None	No	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom E9 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	310	0	$51	$180	$40	2.7
Classroom E9 HS 11-12	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.3	1,281	0	$210	$710	$140	2.7
Classroom F block HS 11-12	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	466	0	$76	$270	$60	2.7
Classroom F block HS 11-12	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.2	732	0	$120	$400	$80	2.7
Classroom F1 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F10 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F11 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F12 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F13 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom F15 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F17 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom F19 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F2 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F21 HS 11-12	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.1	274	0	$45	$150	$30	2.7
Classroom F4 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,647	0	$270	$910	$180	2.7
Classroom F6 HS 11-12	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	S	32	2,520		None	No	3	LED - Fixtures: Ambient 2x4 Fixture	Occupancy Sensor	32	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom F6 HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,372	0	$225	$760	$150	2.7
Classroom F8 HS 11-12	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	S	18	2,520		None	No	18	LED - Fixtures: Ambient 2x2 Fixture	Occupancy Sensor	18	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom medical HS 11-12	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.5	1,863	0	$306	$1,060	$240	2.7
Conference auditorium HS 11-12	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.7	2,794	-1	$459	$1,870	$310	3.4
Corridor 11-12 HS 11-12	21	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	21	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 11-12 HS 11-12	177	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	177	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	9.4	48,397	-10	$7,946	$24,110	$9,740	1.8
Corridor B18 Hallway HS 11-12	3	LED - Fixtures: Ambient 2x4 Fixture	Wall Switch	S	50	3,360	5	None	Yes	3	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	50	2,318	0.0	172	0	$28	$280	$110	6.0
Corridor gym HS 11-12	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
Corridor gym HS 11-12	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	27	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.4	7,383	-2	$1,212	$3,800	$1,490	1.9
Corridor little A hall HS 11-12	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
Corridor little A hall HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	0.8	4,101	-1	$673	$2,180	$830	2.0
Corridor little C HS 11-12	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	8	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	0.4	2,187	0	$359	$1,270	$440	2.3
Culinary Classroom - A6 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,520	0.0	91	0	$15	$50	$10	2.7
Culinary Classroom - A6 HS 11-12	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.8	3,143	-1	$516	$2,030	$340	3.3
Dance studio HS 11-12	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
Dance studio HS 11-12	26	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	26	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.8	3,026	-1	$497	$1,970	$330	3.3
Dining Area cafe a HS 11-12	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,520		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	0	0	$0	$0	$0	0.0
Dining Area cafe b HS 11-12	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	S	29	2,520		None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.0	0	0	$0	$0	$0	0.0
Electrical Room 1 HS 11-12	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	630	4	None	Yes	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	435	0.0	4	0	$1	$150	$20	204.8
Electrical Room 1 (1) HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	46	0	$8	$100	$20	10.7

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Room 1 (2) HS 11-12	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	630	4	None	Yes	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	435	0.0	4	0	$1	$150	$20	204.8
Electrical Room 1 (3) HS 11-12	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	630	4	None	Yes	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	435	0.0	4	0	$1	$150	$20	204.8
Electrical Room 6 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	46	0	$8	$100	$20	10.7
Electrical Room 9 HS 11-12	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	630		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	630	0.0	0	0	$0	$0	$0	0.0
Electrical Room roof hatch B28 HS 11-12	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	630		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	630	0.0	0	0	$0	$0	$0	0.0
Elevator HS 11-12	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	630	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	630	0.0	5	0	$1	$30	$0	37.7
Gymnasium 1 HS 11-12	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
Gymnasium 1 HS 11-12	30	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	2,880	4	None	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.2	854	0	$140	$660	$70	4.2
Gymnasium 2 HS 11-12	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
Gymnasium 2 HS 11-12	24	LED Lamps: (1) 18.5W Plug-In Lamp	Wall Switch	S	17	2,880	4	None	Yes	24	LED Lamps: (1) 18.5W Plug-In Lamp	Occupancy Sensor	17	1,987	0.1	401	0	$66	$660	$70	9.0
Gymnasium aux HS 11-12	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3, 4	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.8	3,592	-1	$590	$2,030	$340	2.9
Gymnasium training HS 11-12	20	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	2,880	4	None	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,987	0.1	285	0	$47	$660	$70	12.6
Kitchen 11-12 HS 11-12	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	3,360	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	19	3,360	0.0	26	0	$4	$30	$0	7.1
Kitchen 11-12 HS 11-12	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	3,360	4	None	Yes	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	2,318	0.0	21	0	$3	$150	$20	38.4
Kitchen 11-12 HS 11-12	7	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	3,360	4	None	Yes	7	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	2,318	0.0	72	0	$12	$330	$40	24.5
Kitchen 11-12 HS 11-12	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,360	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.1	610	0	$100	$250	$50	2.0
Kitchen 11-12 HS 11-12	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,360	3	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	3,360	0.1	610	0	$100	$250	$50	2.0
Kitchen 11-12 HS 11-12	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 4	Relamp	Yes	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,318	0.9	4,648	-1	$763	$2,160	$410	2.3
Locker Room boys HS 11-12	6	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,880		None	No	6	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room boys HS 11-12	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,880	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,880	0.0	51	0	$8	$40	$10	3.6
Locker Room boys HS 11-12	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3, 4	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.6	2,794	-1	$459	$1,720	$280	3.1
Locker Room boys 2 HS 11-12	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,880		None	No	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room boys 2 HS 11-12	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	2,880	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,880	0.1	272	0	$45	$160	$20	3.1
Locker Room boys 2 HS 11-12	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3, 4	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.5	2,261	0	$371	$1,520	$240	3.4
Locker Room girl gym HS 11-12	5	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	2,880	3	Relamp	No	5	LED Lamps: LED Lamps	Wall Switch	19	2,880	0.0	111	0	$18	$130	$10	6.6

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Locker Room girl gym HS 11-12	1	Incandescent: (1) 60W A21 Screw-In Lamp	Wall Switch	S	60	2,880	3	Relamp	No	1	LED Lamps: LED Lamps	Wall Switch	9	2,880	0.0	162	0	$27	$30	$0	1.1
Locker Room girl gym HS 11-12	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Wall Switch	S	17	2,880		None	No	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Wall Switch	17	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room girl gym HS 11-12	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,880		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room girl gym HS 11-12	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3, 4	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.6	2,660	-1	$437	$1,670	$270	3.2
Locker Room girls 2 HS 11-12	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,880		None	No	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,880	0.0	0	0	$0	$0	$0	0.0
Locker Room girls 2 HS 11-12	1	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	S	158	2,880	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 8' Lamps	Wall Switch	72	2,880	0.1	272	0	$45	$160	$20	3.1
Locker Room girls 2 HS 11-12	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,880	3, 4	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,987	0.5	2,261	0	$371	$1,520	$240	3.4
Mechanical 11-12 HS 11-12	11	LED Lamps: (1) 17W A19 Screw-In Lamp	Wall Switch	S	17	3,360		None	No	11	LED Lamps: (1) 17W A19 Screw-In Lamp	Wall Switch	17	3,360	0.0	0	0	$0	$0	$0	0.0
Mechanical 11-12 HS 11-12	22	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 4	Relamp	Yes	22	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,318	1.2	6,015	-1	$988	$2,610	$510	2.1
Mechanical maintenance room HS 11-12	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 4	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,318	0.3	1,707	0	$280	$890	$150	2.6
Office HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	233	0	$38	$250	$40	5.5
Office - admin HS 11-12	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	349	0	$57	$480	$70	7.2
Office - Assistant Principal HS 11-12	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
Office - Assistant Principal HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	233	0	$38	$250	$40	5.5
Office - Assistant Principal HS 11-12	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.2	615	0	$101	$600	$100	4.9
Office - athletic HS 11-12	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.3	1,230	0	$202	$860	$160	3.5
Office - athletic director HS 11-12	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	2,520	0.0	44	0	$7	$40	$10	4.1
Office - athletic director HS 11-12	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.2	615	0	$101	$600	$100	4.9
Office - Enclosed Main HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	466	0	$76	$530	$80	5.9
Office - Enclosed Main HS 11-12	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.8	3,076	-1	$505	$1,660	$340	2.6
Office - Principal HS 11-12	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.2	582	0	$96	$580	$90	5.1
Office - side HS 11-12	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
Office - side HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	233	0	$38	$250	$40	5.5
Office - side HS 11-12	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.6	2,461	-1	$404	$1,390	$280	2.7
Office - Store HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,739	0.1	233	0	$38	$250	$40	5.5

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Office B14 HS 11-12	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
Office B14 HS 11-12	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520		None	No	3	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,520	0.0	0	0	$0	$0	$0	0.0
Office B14 HS 11-12	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	1.0	3,691	-1	$606	$2,250	$430	3.0
Restroom - A5 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	69	0	$11	$50	$10	3.6
Restroom - A9 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	69	0	$11	$50	$10	3.6
Restroom - female HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - Female 1 HS 11-12	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	S	9	1,890		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,890	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - feMale 2 (1) HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - Female 4 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - Male HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - Male 1 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - Male 2 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,890	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,890	0.0	137	0	$23	$100	$20	3.6
Restroom - Male 4 HS 11-12	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,890	3	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,890	0.0	33	0	$5	$40	$10	5.5
Restroom - Male 5 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Stairs F block HS 11-12	4	LED - Fixtures: Ambient 2x4 Fixture	None		32	8,760	5	None	Yes	4	LED - Fixtures: Ambient 2x4 Fixture	High/Low Control	32	6,044	0.0	382	0	$63	$280	$140	2.2
Stairs F block HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch		62	8,760	3, 5	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.1	809	0	$133	$380	$90	2.2
Storage 2 HS 11-12	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3, 4	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	435	0.1	58	0	$10	$250	$40	22.0
Storage 3 HS 11-12	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3, 4	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	435	0.1	116	0	$19	$530	$80	23.5
Storage 30 HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	23	0	$4	$50	$10	10.7
Storage a11 HS 11-12	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	6	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	630	0.1	121	0	$20	$530	$60	23.7
Storage E hall HS 11-12	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	23	0	$4	$50	$10	10.7
Theater auditorium HS 11-12	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
Theater auditorium HS 11-12	38	LED - Fixtures: Downlight Recessed	Wall Switch	S	200	350		None	No	38	LED - Fixtures: Downlight Recessed	Wall Switch	200	350	0.0	0	0	$0	$0	$0	0.0
Theater auditorium HS 11-12	48	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	850	3, 4	Relamp	Yes	48	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	587	1.5	1,885	0	$309	$3,750	$620	10.1

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Theater auditorium HS 11-12	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	850	3, 4	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	587	0.6	746	0	$122	$1,620	$260	11.1
Classroom G102 Core Building	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom G102 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G104 Core Building	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom G104 Core Building	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.1	241	0	$40	$270	$30	6.1
Classroom G106 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom G106 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G108 Core Building	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom G111 Core Building	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom G111 Core Building	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.1	241	0	$40	$270	$30	6.1
Classroom G113 Core Building	11	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	11	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.4	1,708	0	$280	$970	$220	2.7
Classroom G113 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G115 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom G115 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G201 Core Building	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom G201 Core Building	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	161	0	$26	$180	$20	6.1
Classroom G202 Core Building	22	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	22	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.9	3,415	-1	$561	$1,950	$440	2.7
Classroom G202 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G204 Core Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	310	0	$51	$180	$40	2.7
Classroom G205 Core Building	15	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	15	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,328	0	$382	$1,330	$300	2.7
Classroom G205 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G206 Core Building	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	2,520	0.0	0	0	$0	$0	$0	0.0
Classroom G206 Core Building	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	776	0	$127	$440	$100	2.7
Classroom G208 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom G210 Core Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.1	466	0	$76	$270	$60	2.7

Location	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom G212 Core Building	27	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	27	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	1.1	4,191	-1	$688	$2,390	$540	2.7
Classroom G212 Studio 1 and 2 Core Building	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,520	0.4	1,464	0	$240	$810	$160	2.7
Classroom G212 Studio 1 and 2 Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	621	0	$102	$350	$80	2.6
Classroom G212 Studio 1 and 2 Core Building	18	Metal Halide: (1) 250W Lamp	Wall Switch	S	295	2,520	1	Fixture Replacement	No	18	LED - Fixtures: Architectural Flood/Spot Luminaire	Wall Switch	75	2,520	2.9	10,977	-2	$1,802	$11,830	$900	6.1
Classroom G218 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom G222 Core Building	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom G222 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G223 Core Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	931	0	$153	$530	$120	2.7
Classroom G224 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,794	-1	$459	$1,590	$360	2.7
Classroom G225 Core Building	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom G225 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G227 Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.2	621	0	$102	$350	$80	2.6
Classroom G229 Core Building	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.6	2,173	0	$357	$1,240	$280	2.7
Classroom G229 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G231 Core Building	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom G231 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Classroom G235 Core Building	17	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	2,520	3	Relamp	No	17	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,520	0.7	2,639	-1	$433	$1,500	$340	2.7
Classroom G235 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 4L	Occupancy Sensor	S	62	2,520	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,520	0.0	80	0	$13	$90	$10	6.1
Corridor core first floor Core Building	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
Corridor core first floor Core Building	36	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	36	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	1.9	9,843	-2	$1,616	$4,880	$1,980	1.8
Corridor core first floor Core Building	17	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 5	Relamp	Yes	17	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,318	0.5	2,465	-1	$405	$2,350	$770	3.9
Corridor main entrance Core Building	22	Compact Fluorescent: (1) 26W Plug-In Lamp	Wall Switch	S	26	3,360	3, 5	Relamp	Yes	22	LED Lamps: LED Lamps	High/Low Control	19	2,318	0.2	1,048	0	$172	$1,690	$790	5.2
Corridor main entrance Core Building	144	LED - Linear Tubes: (2) 4' Lamps	None	S	29	3,360	5	None	Yes	144	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	2,318	0.9	4,785	-1	$786	$6,760	$5,040	2.2
Corridor ramp theartgre Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	0.2	1,094	0	$180	$630	$220	2.3
Corridor ramp theartgre Core Building	43	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 5	Relamp	Yes	43	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,318	1.2	6,235	-1	$1,024	$6,050	$1,940	4.0

	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Corridor second floor Core Building	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor second floor Core Building	61	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	3,360	3, 5	Relamp	Yes	61	LED - Linear Tubes: (4) 4' Lamps	High/Low Control	58	2,318	3.2	16,679	-3	$2,739	$8,500	$3,360	1.9
Electrical Room 2 Core Building	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.4	366	0	$60	$810	$160	10.8
Electrical Room dimmer Core Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	630	0.1	116	0	$19	$270	$60	11.0
Mechanical room core Core Building	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
Mechanical room core Core Building	22	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,360	3, 4	Relamp	Yes	22	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,318	0.7	3,414	-1	$561	$1,770	$290	2.6
Office - Enclosed Core Core Building	6	Compact Fluorescent: (2) 26W A19 Screw-In Lamps	Wall Switch	S	52	2,520	3	Relamp	No	6	LED Lamps: LED Lamps	Wall Switch	37	2,520	0.1	249	0	$41	$230	$10	5.4
Office - Enclosed Core Core Building	23	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	23	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	1.2	4,717	-1	$774	$2,690	$530	2.8
Office - Enclosed Core Core Building	14	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	14	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,739	0.4	1,522	0	$250	$1,570	$180	5.6
Office G114 Core Building	13	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	2,520	4	None	Yes	13	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,739	0.0	101	0	$17	$150	$20	7.9
Office G114 Core Building	18	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	18	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	1.0	3,691	-1	$606	$2,250	$430	3.0
Office G114 Core Building	40	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,520	3, 4	Relamp	Yes	40	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,739	1.1	4,350	-1	$714	$4,530	$510	5.6
Office G219 Core Building	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.3	1,025	0	$168	$770	$140	3.7
Office G226 Core Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	2,520	3, 4	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,739	0.2	615	0	$101	$600	$100	4.9
Restroom - Female Core Building	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.3	769	0	$126	$590	$120	3.7
Restroom - Female G125 Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.2	615	0	$101	$500	$100	4.0
Restroom - G125 Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.2	615	0	$101	$500	$100	4.0
Restroom - Male 1 Core Building	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.3	769	0	$126	$590	$120	3.7
Restroom - Male 1 Core Building	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,890	3	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,890	0.0	60	0	$10	$90	$10	8.1
Restroom - Male 2 Core Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male 3 Core Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.1	308	0	$51	$330	$60	5.3
Restroom - Male 7 Core Building	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,890	4	None	Yes	4	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,304	0.0	23	0	$4	$440	$60	99.8
Restroom - Male 7 Core Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,890	3	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,890	0.1	233	0	$38	$180	$40	3.7
Restroom - Unisex Core Building	6	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,890	4	None	Yes	6	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	1,304	0.0	35	0	$6	$730	$100	110.3
Restroom - Unisex Core Building	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,890		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	1,890	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Unisex Core Building	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,890	3, 4	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,304	0.4	1,077	0	$177	$770	$160	3.5
Stairs - Core G Side Core Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	8,760	3, 5	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	6,044	0.2	2,428	-1	$399	$580	$270	0.8
Storage 4 Core Building	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.0	46	0	$8	$100	$20	10.7
Storage 4 Core Building	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3	Relamp	No	3	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	630	0.1	116	0	$19	$270	$60	11.0
Storage G220 Core Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3	Relamp	No	6	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	630	0.2	233	0	$38	$530	$120	10.7
Storage G221 Core Building	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	630	3	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	630	0.1	137	0	$23	$300	$60	10.7
Storage G233 Core Building	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	630	3	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	630	0.2	155	0	$25	$350	$80	10.6
Theater auditorium Core Building	9	Compact Fluorescent: (2) 26W A19 Screw-In Lamps	Wall Switch	S	52	850	3	Relamp	No	9	LED Lamps: LED Lamps	Wall Switch	37	850	0.1	126	0	$21	$340	$20	15.4
Theater auditorium Core Building	30	Halogen Incandescent: (1) 150W Screw-In Lamp	Wall Switch	S	150	350	1	Fixture Replacement	No	30	LED - Fixtures: Downlight Recessed	Wall Switch	23	350	2.7	1,467	0	$241	$5,690	$150	23.0
Theater auditorium Core Building	30	Halogen Incandescent: (1) 100W Screw-In Lamp	Wall Switch	S	100	350	1	Fixture Replacement	No	30	LED - Fixtures: Downlight Recessed	Wall Switch	23	350	1.7	889	0	$146	$5,690	$150	37.9
Stage auditorium Core Building	56	High-Pressure Sodium: HPL 750WX Stage Lamp	Wall Switch	S	750	350	1	Fixture Replacement	No	56	LED - Fixtures: Architectural Flood/Spot Luminaire	Wall Switch	225	350	21.2	11,319	-2	$1,858	$36,810	$2,800	18.3
Theater auditorium Core Building	47	Halogen Incandescent: (1) 150W Screw-In Lamp	Wall Switch	S	150	850	1	Fixture Replacement	No	47	LED - Fixtures: Downlight Recessed	Wall Switch	23	850	4.3	5,581	-1	$916	$8,910	$240	9.5
Theater auditorium Core Building	3	Halogen Incandescent: (1) 150W Screw-In Lamp	Wall Switch	S	150	0		None	No	3	Halogen Incandescent: (1) 150W Screw-In Lamp	Wall Switch	150	0	0.0	0	0	$0	$0	$0	0.0
Theater auditorium Core Building	12	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	12	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Theater auditorium Core Building	58	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	850	3	Relamp	No	58	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	850	0.7	949	0	$156	$1,470	$290	7.6
Theater auditorium Core Building	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	850	3	Relamp	No	8	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	850	0.2	217	0	$36	$710	$80	17.7
Theater auditorium Core Building	56	Halogen Incandescent: (1) 50W Lamp	Wall Switch	S	50	850	1	Fixture Replacement	No	56	LED - Fixtures: Downlight Recessed	Wall Switch	8	850	1.7	2,225	0	$365	$10,620	$280	28.3
Stage auditorium Core Building	18	High-Pressure Sodium: (1) 250W Lamp	Wall Switch	S	295	350	1	Fixture Replacement	No	18	LED - Fixtures: Architectural Flood/Spot Luminaire	Wall Switch	100	350	2.5	1,351	0	$222	$11,830	$900	49.3
Exterior - Pressbox	1	LED Lamps: (1) 9W Plug-In Lamp	Photocell		9	4,380		None	No	1	LED Lamps: (1) 9W Plug-In Lamp	Photocell	9	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior - Pressbox	1	Linear Fluorescent - T8: 8' T8 (59W) - 1L	Wall Switch		58	4,380	3	Relamp	No	1	LED - Linear Tubes: (1) 8' Lamp	Wall Switch	36	4,380	0.0	96	0	$16	$50	$10	2.5
Exterior - Pressbox	2	Metal Halide: (1) 70W Lamp	Photocell		95	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	21	4,380	0.0	648	0	$108	$530	$100	4.0
Office - Pressbox	2	Compact Fluorescent: (1) 13W Plug-In Lamp	Wall Switch	S	13	1,638	3	Relamp	No	2	LED Lamps: LED Lamps	Wall Switch	9	1,638	0.0	14	0	$2	$50	$0	21.1
Office - Pressbox	2	LED Lamps: (1) 9W Plug-In Lamp	Wall Switch	S	9	1,638		None	No	2	LED Lamps: (1) 9W Plug-In Lamp	Wall Switch	9	1,638	0.0	0	0	$0	$0	$0	0.0
Office - Pressbox	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,638	3, 4	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,130	0.4	984	0	$161	$1,320	$200	6.9
Stadium Lighting	42	Metal Halide: (1) 1500W Lamp	Wall Switch		1,610	185	1	Fixture Replacement	No	42	LED - Fixtures: Architectural Flood/Spot Luminaire	Wall Switch	450	185	0.0	9,013	0	$1,505	$27,600	$2,100	16.9

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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Room cafe HS 9 -10	DHW System	3	DHW Circulation Pump	0.13	59.0%	No			W	8,760		No	59.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	DHW System	1	DHW Circulation Pump	0.20	59.5%	No			W	8,760		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical HS 11-12	DHW System	1	DHW Circulation Pump	0.50	73.0%	No			W	8,760		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Core Building	Boiler	2	Combustion Air Fan	0.50	73.0%	No			B	2,745		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Air Compressor	1	Air Compressor	5.00	82.0%	No			W	1,000		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Chilled Water System	2	Chilled Water Pump	25.00	93.0%	Yes			W	1,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Heating hot water Pump	2	Heating Hot Water Pump	0.20	59.5%	No			W	2,745		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Gym Area	2	Supply Fan	10.00	88.0%	Yes	Trane	YCH330B4PN6B2	W	2,713		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room-HS - 9-10	Elevator	1	Other	15.00	90.0%	No			W	500		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Kitchen Core building	2	Supply Fan	1.50	80.0%	No			W	2,196		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Package Unit-Core building	1	Supply Fan	3.00	84.2%	No			W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1
Mechanical room Core Building	Chilled Water Pump	1	Chilled Water Pump	30.00	91.0%	No			W	2,000	7	No	94.1%	Yes	1	6.0	19,539	0	$3,263	$16,700	$1,500	4.7
Mechanical room Core Building	Chilled Water Pump	2	Chilled Water Pump	60.00	92.4%	Yes	US Electrical Motors	H1010-2052043R174	W	1,000		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room Core Building	Heating Hot Water Pump	1	Heating Hot Water Pump	0.13	59.0%	No			W	2,745		No	59.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room Core Building	Heating Hot Water Pump	2	Heating Hot Water Pump	25.00	89.5%	Yes			W	2,034		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Kitchen Hood Exhaust Fan	1	Kitchen Hood Exhaust Fan	3.00	84.2%	No			W	1,600	8	No	89.5%	Yes	1	0.1	2,544	12	$593	$5,100	$200	8.3
Mechanical room Core Building	Sewer Pumps	2	Process Pump	2.00	82.2%	No			W	2,745		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room Core Building	Water Treatment	1	Process Pump	7.50	87.0%	Yes			W	3,391		No	87.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Exhaust-Core Building	2	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Exhaust-Core Building	2	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Rooftop Core Building	Exhaust-Core Building	8	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Exhaust-Core Building	7	Exhaust Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Exhaust-Core Building	2	Exhaust Fan	1.00	79.0%	No			W	2,196		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Exhaust-Core Building	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building-RTU 1	1	Supply Fan	5.00	85.0%	No			W	2,196	6	No	89.5%	Yes	1	1.5	3,941	0	$658	$5,600	$900	7.1
Rooftop HS 11-12	11-12 Building-RTU 8	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Dance studio	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Supply Fan	3.00	84.2%	No			W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1
Rooftop HS 11-12	Wood shop-RTU 11	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU 4	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU 3	1	Supply Fan	3.00	84.2%	No			W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1
Rooftop HS 11-12	Dance studio- RTU 12	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU 7	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C block HS 11-12	RTU 30	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop F HS 11-12	RTU 27	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	RTU 24	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	RTU 26	1	Supply Fan	1.50	80.0%	No			W	2,196		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Auditorium RTU	1	Supply Fan	7.50	87.0%	Yes			W	2,713		No	87.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	RTU 16	1	Supply Fan	3.00	84.2%	No			W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Rooftop Gym hall HS 11-12	RTU 17	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	11-12 Building	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	RTU 18-19-22-23	4	Supply Fan	15.00	90.0%	Yes			W	2,713		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 10-11	RTU 2- 36	2	Supply Fan	1.50	80.0%	No			W	2,196		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	RTU 14	1	Supply Fan	3.00	84.2%	No			W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1
Rooftop C Block HS 11-12	11-12 Building C block	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building Band Room	1	Supply Fan	7.50	87.0%	Yes			W	2,713		No	87.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building Dance Room	2	Supply Fan	0.75	70.0%	No			W	2,196		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Trainers Room	1	Supply Fan	1.50	80.0%	No			W	2,196		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building C block	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	RTU 32	1	Supply Fan	1.50	80.0%	No			W	2,196		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Exhaust System	17	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Exhaust System	7	Exhaust Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Exhaust System	2	Exhaust Fan	0.75	77.0%	No			W	2,196		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Exhaust System	3	Exhaust Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11- 11-12 Building	Indoor Unit	1	Supply Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11 Wood Shops- 11-12 Building	Unit Heater	1	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11- 11-12 Building	Indoor Unit	1	Supply Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom B16 HS 11-12	Air Handling Unit	4	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Server Room HS 11-12	Air Handling Unit	1	Supply Fan	3.00	84.2%	No	Emerson	NRMB1A4C2RA0U80	W	2,196	6	No	89.5%	Yes	1	0.9	2,422	0	$405	$5,100	$200	12.1
Server Room HS 11-12	Air Handling Unit	1	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Locker Room boys HS 11-12	Air Handling Unit-3	1	Supply Fan	0.25	67.0%	No	EMI		W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Locker Room boys HS 11-12	Air Handling Unit-5	1	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Locker Room boys 2 HS 11-12	Air Handling Unit	1	Supply Fan	0.25	67.0%	No	Daikin	FTKN09NMVJU	W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Locker Room girls 2 HS 11-12	Air Handling Unit	1	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical maintenance room HS 11-12	Air Handling Unit	1	Supply Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Office - athletic HS 11-12	Air Handling Unit	1	Supply Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Storage 30 HS 11-12	Air Handling Unit	1	Supply Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Storage E hall HS 11-12	Air Handling Unit	1	Supply Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
E and F Block HS 11-12	Unit Ventilator	34	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
A and B Block HS 11-12	Unit Ventilator	14	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
C Block HS 11-13	Unit Ventilator	9	Supply Fan	0.25	67.0%	No			W	2,196		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Package unit-Maze duct	1	Supply Fan	10.00	88.0%	Yes			W	2,713		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU-29	1	Supply Fan	2.00	82.2%	No			W	2,196		No	82.2%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11 wood shops HS 11-12	Air Compressor	1	Air Compressor	3.70	81.0%	No	Coleman	B600BPL60V	W	1,000		No	81.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11 wood shops HS 11-12	Air Compressor	1	Air Compressor	0.80	77.0%	No	Porter cable		W	1,000		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop F HS 11-12	Science Lab	2	Exhaust Fan	1.00	79.0%	No	Power Ventilator	VCR-105 C1A10	W	2,196		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop F HS 11-12	F bolck Exhaust Fan-19	1	Exhaust Fan	1.00	79.0%	No			W	2,196		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop F HS 11-12	F bolck Exhaust Fan	3	Exhaust Fan	0.67	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Rooftop F HS 11-12	F bolck Exhaust Fan	4	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Auditorium	2	Exhaust Fan	0.67	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Gym Halls	3	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Gym Halls	6	Exhaust Fan	0.67	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Gym Halls	4	Exhaust Fan	0.67	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen 11-12 HS 11-12	Kitchen	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Fume Hoods	6	Exhaust Fan	0.75	77.0%	No	Dayton		W	2,196		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	2	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Nurse Office	1	Exhaust Fan	1.00	79.0%	No			W	2,196		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Wood Shops	1	Exhaust Fan	0.67	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Exhaust Fan-2	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Exhaust Fan-9	1	Exhaust Fan	0.75	77.0%	No			W	2,196		No	77.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Exhaust Fan	0.33	69.0%	No		FX13B	W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Exhaust Fan-36 and 37	2	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Exhaust Fan C Block	3	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Exhaust Fan C Block	12	Exhaust Fan	0.33	69.0%	No			W	2,196		No	69.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop C Block HS 11-12	Exhaust Fan C Block	9	Exhaust Fan	1.00	79.0%	No			W	2,196		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 11-12	Boiler -Heating System	2	Heating Hot Water Pump	25.00	92.5%	Yes			W	4,067		No	92.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical 11-12	Boiler -Heating System	2	Heating Hot Water Pump	10.00	90.5%	Yes			W	3,391		No	90.5%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen 11-12	Ventilation Fans	5	Ventilation Fan	0.25	67.0%	No			W	2,745		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A11 wood shops HS 11-12	Car Lift Motor	1	Other	1.00	79.0%	No			W	1,000		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A12 HS 11-12	Pottery Wheel	8	Other	1.00	79.0%	No			W	600		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom A12 HS 11-12	Pottery Wheel Lab	1	Other	0.50	75.0%	No			W	600		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator HS 11-12	Elevator	1	Other	10.00	88.0%	No			W	500		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom H205-HS -9-10	Pottery Wheel	5	Other	1.00	79.0%	No			W	600		No	79.0%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen 9-10	Ventilation Fans	6	Ventilation Fan	0.25	67.0%	No			W	2,745		No	67.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator HS 9-10	Elevator	1	Other	10.00	88.0%	No			W	500		No	88.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Exhaust System	1	Exhaust Fan	0.20	59.5%	No			W	2,196		No	59.5%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Dust Collector	1	Exhaust Fan	5.00	85.0%	No			W	2,196		No	85.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room HS 9 -10	AHU- Mechanical Room	1	Supply Fan	10.00	88.0%	No			W	2,713	6	No	91.7%	Yes	1	3.0	9,250	0	$1,545	$7,500	$1,100	4.1
Exterior Roof Air handlers HS- Core	Core Building	2	Supply Fan	40.00	93.0%	Yes			W	3,254		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Roof Air handlers HS- Core	Core Building	2	Return Fan	30.00	93.6%	Yes			W	3,254		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Locker Room H Block -9-10	Locker room	1	Supply Fan	0.50	73.0%	No			W	2,196		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Cooling Tower motor	2	Cooling Tower Fan	2.00	84.0%	Yes			W	2,745		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Classroom G212 Core Building	Classroom	1	Supply Fan	0.50	73.0%	No			W	2,196		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Library Core Building	2	Supply Fan	5.00	85.0%	No	McQuay	RSD708BY	W	2,196	6	No	89.5%	Yes	2	3.1	7,882	0	$1,316	$11,300	$1,800	7.2

		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?	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior Rooftop Core Building	Library Core Building	1	Supply Fan	5.00	85.0%	No	McQuay	RSD800CYY	W	2,196	6	No	89.5%	Yes	1	1.5	3,941	0	$658	$5,600	$900	7.1
Exterior Rooftop Core Building	Library Core Building	1	Supply Fan	5.00	85.0%	No	McQuay	RSD800CYY	W	2,196	6	No	89.5%	Yes	1	1.5	3,941	0	$658	$5,600	$900	7.1
Exterior Rooftop Core Building	Cafetria Core Building	2	Supply Fan	7.50	87.0%	No	McQuay	RAH047CSY	W	2,713	6	No	91.0%	Yes	2	4.6	14,120	0	$2,358	$13,400	$2,000	4.8
Exterior Rooftop Core Building	Heat Recovery Unit	1	Supply Fan	10.00	91.0%	Yes			W	2,713		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Heat Recovery Unit	1	Return Fan	7.50	90.0%	Yes			W	2,713		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Heat Recovery Unit	1	Supply Fan	10.00	91.0%	Yes			W	2,713		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Heat Recovery Unit	1	Return Fan	7.50	90.0%	Yes			W	2,713		No	90.0%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical room Core Building	Mechanical room Core Building	1	Supply Fan	0.50	73.0%	No			W	2,196		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Theater auditorium Core Building	Theater auditorium Core Building	1	Supply Fan	0.50	73.0%	No			W	2,196		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Classrooms/Office Various HS 9-10	High School 9-10	60	Supply Fan	0.75	75.0%	No			W	2,196		No	75.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Main Office- Dry Cooler	1	Other	0.50	73.0%	No	Heatcraft	RFQ5WP	W	2,745		No	73.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Mechanical AHU- Dry Cooler	2	Other	1.00	80.0%	No	Westinghouse	ST050A0Q	W	2,745		No	80.0%	No		0.0	0	0	$0	$0	$0	0.0
Exterior- Pressbox	Field Irrigation	1	Other	3.00	84.0%	Yes			W	800		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0

Packaged HVAC Inventory & Recommendations

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Exterior 2 HS 9 -10	Tech Offices	1	Split-System	3.00		10.00			38TKBQ48300	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 2 HS 9 -10	Offices	1	Split-System	2.50		9.28			H2RD030S06B	B	9	Yes	1	Split-System	2.50		16.00		0.7	633	0	$106	$5,100	$300	45.4
Exterior 2 HS 9 -10	Offices	1	Split-System	3.00		9.28			AGC036A2C1	B	9	Yes	1	Split-System	3.00		16.00		0.8	760	0	$127	$6,000	$300	44.9
Exterior 2 HS 9 -10	Offices	1	Split-System	2.50		11.00		Goodman	GSC13G30	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior 2 HS 9 -10	Server room	1	Split-System	3.50		13.00		Fujitsu	AQU42RLX	B	9	Yes	1	Split-System	3.50		16.00		0.3	282	0	$47	$7,000	$400	140.0
Exterior 2 HS 9 -10	Server room	1	Package Unit	5.00		12.99		McQuay	RAV060H0FA0AA	B	9	Yes	1	Package Unit	5.00		16.00		0.4	406	0	$68	$8,600	$500	119.6
Exterior 2 HS 9 -10	Classroom	1	Split-System	2.00		12.00				W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	9-10 Building office- CU 1	1	Split-System	10.00		11.13		Lennox	LSA120C-1G	B	9	Yes	1	Split-System	10.00		14.00		1.1	1,030	0	$172	$17,300	$800	96.0
Exterior Rooftop HS 9 -10	Principal Office	1	Split-System	7.50		10.00			MH2D9900Aa	B	9	Yes	1	Split-System	7.50		14.00		1.3	1,198	0	$200	$13,700	$600	65.5
Exterior 2 HS 9 -10	Tech Offices	1	Split-System	2.00		10.00				W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Offices	1	Split-System	3.50		10.20		Daikin	RZR42PVJU	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Offices	1	Split-System	2.00		10.00				W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop HS 9 -10	Gym Area	2	Package Unit	27.50	480.00	10.00	0.8 AFUE	Trane	YCH330B4PN6B2	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Core Building	Kitchen Core building	2	Package Unit	3.00		9.28		York	04CE036A25A	B	9	Yes	2	Package Unit	3.00		16.00		1.6	1,520	0	$254	$14,200	$600	53.6
Exterior Rooftop Core Building	Core Building	1	Package Unit	12.50		9.28		Trane	TCD150C30AAA	B	9	Yes	1	Package Unit	12.50		14.00		2.7	2,543	0	$425	$16,200	$1,100	35.6
Exterior Rooftop Core Building	Core Building	2	Split-System	2.00		9.28		EMI	SCC24DF0000AA0A	B	9	Yes	2	Split-System	2.00		16.00		1.1	1,013	0	$169	$8,800	$400	49.6
Exterior Rooftop Core Building	Core Building	1	Split-System	5.00		9.28		York	H1RA060S46A	B	9	Yes	1	Split-System	5.00		16.00		1.4	1,267	0	$212	$10,800	$500	48.7
Exterior Rooftop Core Building	Core Building	1	Split-System	3.00		9.28		Arcoaire	N4A360GLC300	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Split-System Air-Source HP	0.75	9.00	11.00	7.7 HSPF	Mitsuibishi	SUZ-KA09NA	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C block HS 11-12	Girls Locker Room Old and New	2	Split-System	0.75		9.28		EMI	S1HA9000D10	B	9	Yes	2	Split-System	0.75		16.00		0.4	380	0	$63	$7,100	$200	108.7

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop HS 11-12	11-12 Building-RTU 1	1	Package Unit	12.50		9.28		York	DR150C00S4TZZ 40001B	B	9	Yes	1	Package Unit	12.50		14.00		2.7	2,543	0	$425	$16,200	$1,100	35.6
Rooftop HS 11-12	11-12 Building-RTU 8	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Rooftop HS 11-12	Dance studio	1	Package Unit	7.50		9.28				W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Package Unit	10.00		9.28				W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Wood shop-RTU 11	1	Package Unit	7.50		9.28				W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU 4	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Rooftop HS 11-12	RTU 3	1	Package Unit	10.00		9.28				B	9	Yes	1	Package Unit	10.00		14.00		2.2	2,034	0	$340	$14,800	$800	41.2
Rooftop HS 11-12	Dance studio- RTU 12	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Package Unit	7.50		9.28				B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Rooftop HS 11-12	RTU 7	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Rooftop C block HS 11-12	RTU 30	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Exterior Rooftop F HS 11-12	RTU 27	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	RTU 24	1	Package Unit	15.00		9.83		Aaon	RM-015-3-0-BA02EJN	B	9	Yes	1	Package Unit	15.00		14.00		2.7	2,540	0	$424	$17,500	$1,300	38.2
Exterior Rooftop Gym hall HS 11-12	RTU 26	1	Package Unit	5.00		9.83		York	DR060C00P4Tzz 20001A	B	9	Yes	1	Package Unit	5.00		16.00		1.2	1,096	0	$183	$8,600	$500	44.2
Exterior Rooftop Gym hall HS 11-12	Auditorium RTU	1	Package Unit	60.00		8.81		Aaon	RN-060	B	9	Yes	1	Package Unit	60.00		12.50		12.1	11,234	0	$1,876	$83,800	$5,100	41.9
Exterior Rooftop Gym hall HS 11-12	RTU 16	1	Package Unit	10.00		9.28		York	DR120C00S4TZZ 30001D	B	9	Yes	1	Package Unit	10.00		14.00		2.2	2,034	0	$340	$14,800	$800	41.2
Exterior Rooftop Gym hall HS 11-12	RTU 17	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	B	9	Yes	1	Package Unit	7.50		14.00		1.6	1,526	0	$255	$10,700	$600	39.6
Exterior Rooftop Gym hall HS 11-12	11-12 Building	1	Package Unit	13.00		10.02		Aaon	RM 13	B	9	Yes	1	Package Unit	13.00		14.00		2.2	2,064	0	$345	$16,400	$1,200	44.1
Exterior Rooftop Gym hall HS 11-12	RTU 18-19-22-23 Gym Area	4	Package Unit	25.00		9.28		York	DR300C00C4TZZ 20001B	B	9	Yes	4	Package Unit	25.00		12.50		16.7	15,551	0	$2,597	$120,100	$8,500	43.0
Rooftop HS 11-12	RTU 2- 36	2	Package Unit	3.00		9.28		York	DR036	B	9	Yes	2	Package Unit	3.00		16.00		1.6	1,520	0	$254	$14,200	$600	53.6

Location	Area(s)/System(s) Served	Existing Conditions: System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	Proposed Conditions: ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Energy Impact & Financial Analysis: Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop C Block HS 11-12	RTU 14	1	Package Unit	10.00		9.28		York	DR120C00S4TZZ 30001D	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building C block	1	Package Unit	13.00		10.02		Aaon	RM 13	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building Band Room	1	Package Unit	30.00		8.81		Aaon	RH 30	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building Dance Room	2	Package Unit	3.00		9.28		Daikin	DBC0363D00000 1SAA	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Trainers Room	1	Package Unit	7.50		11.20		Carrier	38AUZA08A0A5 A0A0A0	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	11-12 Building C block	1	Package Unit	15.00		9.83		Aaon	RM-015-3-0-BA02EJN	B	9	Yes	1	Package Unit	15.00		14.00		2.7	2,540	0	$424	$17,500	$1,300	38.2
Rooftop C Block HS 11-12	RTU 32	1	Package Unit	3.00		9.28		York	DR036	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop F HS 11-12	Classroom-Condensing Units	11	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	11	Split-System	3.00		16.00		9.0	8,361	0	$1,396	$66,200	$3,500	44.9
Exterior Rooftop F HS 11-12	Classroom-Condensing Units	12	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	12	Split-System	3.50		16.00		11.4	10,641	0	$1,777	$83,800	$4,400	44.7
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	1	Split-System	2.00		9.28		Sanyo	SAP243CL	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	1	Split-System	2.00		9.28		EMI		B	9	Yes	1	Split-System	2.00		16.00		0.5	507	0	$85	$4,400	$200	49.6
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	1	Split-System	0.75		11.00		Daikin	RKN09NMV	W		No							0.0	0	0	$0	$0	$0	0.0
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	1	Split-System	2.00		9.28		EMI		B	9	Yes	1	Split-System	2.00		16.00		0.5	507	0	$85	$4,400	$200	49.6
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	2	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	2	Split-System	3.00		16.00		1.6	1,520	0	$254	$12,000	$600	44.9
Exterior Rooftop Gym hall HS 11-12	Classroom-Condensing Units	4	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	4	Split-System	3.50		16.00		3.8	3,547	0	$592	$27,900	$1,500	44.6
Rooftop HS 11-12	Classroom-Condensing Unit 79	1	Split-System	1.50		9.28		York	H1RD018S06G	B	9	Yes	1	Split-System	1.50		16.00		0.4	380	0	$63	$4,100	$200	61.4
Rooftop HS 11-12	Classroom-Condensing Unit 52-48	2	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	2	Split-System	3.50		16.00		1.9	1,774	0	$296	$14,000	$700	44.9
Rooftop HS 11-12	Classroom-Condensing Unit 16	1	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	1	Split-System	3.00		16.00		0.8	760	0	$127	$6,000	$300	44.9
Rooftop HS 11-12	Classroom-Condensing Unit 15 and 8	2	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	2	Split-System	3.50		16.00		1.9	1,774	0	$296	$14,000	$700	44.9
Rooftop HS 11-12	Classroom-Condensing Units	1	Split-System	1.50		9.28			R44186KB100	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Rooftop HS 11-12	Classroom-Condensing Units	1	Split-System	3.00		13.00		Thermal Zone	TZAA-336-DC757	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	11-12 Building	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Condensing Unit 53-49-50-54-51	5	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	5	Split-System	3.50		16.00		4.8	4,434	0	$741	$34,900	$1,800	44.7
Rooftop HS 11-12	Condensing Unit 70	1	Split-System	2.50		9.28		York	H1RD030S06B	B	9	Yes	1	Split-System	2.50		16.00		0.7	633	0	$106	$5,100	$300	45.4
Rooftop HS 11-12	Classroom-Condensing Unit 18	1	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	1	Split-System	3.00		16.00		0.8	760	0	$127	$6,000	$300	44.9
Rooftop HS 11-12	Classroom-Condensing Units 22	1	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	1	Split-System	3.50		16.00		1.0	887	0	$148	$7,000	$400	44.6
Rooftop HS 11-12	Classroom-Condensing Units	1	Split-System Air-Source HP	3.00	40.00	12.10	7.7 HSPF	LG	LUU367HV	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Condensing Units 7-14-13-5-4-3-2-1-9	9	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	9	Split-System	3.50		16.00		8.6	7,981	0	$1,333	$62,800	$3,300	44.6
Rooftop HS 11-12	Classroom-Condensing Unit 6-12-11-10	4	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	4	Split-System	3.00		16.00		3.3	3,040	0	$508	$24,100	$1,300	44.9
Rooftop C Block HS 11-12	Classroom-Condensing Units	1	Split-System	3.00		13.00		Thermal Zone	TZAA-336-DC757	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Classroom-Condensing Units	1	Split-System	1.50		12.00		Sanyo	SAP183C	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Classroom-Condensing Units - 7	1	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	1	Split-System	3.00		16.00		0.8	760	0	$127	$6,000	$300	44.9
Rooftop C Block HS 11-12	Classroom-Condensing Units	1	Split-System	2.00		10.00		Arcoaire		W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop C Block HS 11-12	Classroom-Condensing Units	2	Split-System	3.00		9.28		York	H1RA036S46G	B	9	Yes	2	Split-System	3.00		16.00		1.6	1,520	0	$254	$12,000	$600	44.9
Rooftop C Block HS 11-12	Classroom-Condensing Units	6	Split-System	3.50		9.28		York	H1RA042S46G	B	9	Yes	6	Split-System	3.50		16.00		5.7	5,321	0	$889	$41,900	$2,200	44.7
Kitchen HS 11-12	Unit Heater	1	Unit Heater		10.23		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Office - athletic HS 11-12	Unit Heater	1	Unit Heater		10.23		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Various Location HS 11-12	Unit Heater	8	Unit Heater		100.00					W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	Package unit-Maze duct	1	Package Unit	30.00		9.74		York	DR360	W		No							0.0	0	0	$0	$0	$0	0.0
Rooftop HS 11-12	RTU-29	1	Package Unit	7.50		9.28		York	DR090C00S4TZZ 30001D	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom K112-HS-9-10	Indoor Unit	1	Split-System	1.10		10.00		Movin cool	Classic plus 14	W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical Room HS 9 -10	AHU- Mechanical Room	1	Unit Heater		511.80		1 COP	Electroduct		W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Mechanical Room	1	Unit Heater		25.59		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Mechanical Room	1	Unit Heater		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage Recieving HS 9 -10	Storage receiving room	1	Unit Heater		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage Recieving HS 9 -10	Storage receiving room	1	Unit Heater		10.24		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Storage Recieving HS 9 -10	Storage receiving room	1	Unit Heater		5.12		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Dining Area HS 9 - 10	Dining Area	1	Unit Heater		119.42		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Library room HS 9 - 10	Library room	1	Unit Heater		255.90		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0
Classroom 209 HS 9 -10	Classroom 209	1	Window AC	0.50		11.30		LG	LW6017R	W		No							0.0	0	0	$0	$0	$0	0.0
Office Faculty HS 9 - 10	Office - Faculty J202 A	1	Water Source HP	5.00	68.20	11.00	1 COP	Airedale	SMG60FAMBCA HJA203	W		No							0.0	0	0	$0	$0	$0	0.0
Office Faculty HS 9 - 10	Office Faculty	1	Water Source HP	4.00	68.20	9.28	1 COP	EDPAC	SEXC-04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,426	0	$1,908	$9,400	$300	4.8
Classroom K111 HS 9 -10	Classroom K111	1	Split-System Air-Source HP	4.00	68.20	11.00	1 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	68.20	15.50	8.5 HSPF	8.4	8,676	0	$1,449	$9,200	$400	6.1
Classroom I109 HS 9 -10	Classroom I109	1	Split-System Air-Source HP	4.00	48.00	9.28	2.72014360357281 COP	Airedale	CMP48FCMBCA HKA20N	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	647	0	$108	$9,200	$400	81.4
Classroom I113 HS 9 -10	Classroom I113	1	Water Source HP	4.00	68.20	11.00	1 COP	Airedale	SXG48	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom H110A HS 9 -10	Classroom H110A	1	Water Source HP	6.00	68.20	9.30	1 COP	EDPAC	SEXC 06	B	10	Yes	1	Water Source HP	6.00	68.20	15.00	4.5 COP	7.6	11,876	0	$1,983	$11,200	$500	5.4
Classroom H110B HS 9 -10	Classroom H110B	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom H111A HS 9 -10	Classroom H111A	1	Water Source HP	6.00	68.20	9.30	1 COP	EDPAC	SEXC 06	B	10	Yes	1	Water Source HP	6.00	68.20	15.00	4.5 COP	7.6	11,876	0	$1,983	$11,200	$500	5.4
Classroom H111B HS 9 -10	Classroom H111B	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAA HKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom H112 HS 9 -10	Classroom H112	1	Split-System Air-Source HP	4.00	48.00	9.50	2.78429073856975 COP	Airedale	CMP	W		No							0.0	0	0	$0	$0	$0	0.0

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom I-102 HS 9 -10	Classroom I-102	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAA HKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom I-103 HS 9 -10	Classroom I-103	1	Water Source HP	3.00	68.20	9.30	1 COP	Airedale	SMG	B	10	Yes	1	Water Source HP	3.00	68.20	15.00	4.5 COP	8.8	11,191	0	$1,869	$8,000	$200	4.2
Classroom I-105 HS 9 -10	Classroom I-105	1	Water Source HP	3.00	68.20	9.30	1 COP	Airedale	SMG	B	10	Yes	1	Water Source HP	3.00	68.20	15.00	4.5 COP	8.8	11,191	0	$1,869	$8,000	$200	4.2
Classroom I-106 HS 9 -10	Classroom I-106	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I-110 HS 9 -10	Classroom I-110	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I-111 HS 9 -10	Classroom I-111	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I-112 HS 9 -10	Classroom I-112	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom J-101 HS 9 -10	Classroom J-101	1	Water Source HP	3.00	68.20	9.40	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom J-106 A HS 9 -10	Classroom J-106 A	1	Water Source HP	6.00	68.20	9.30	1 COP	EDPAC	SEXC 06	B	10	Yes	1	Water Source HP	6.00	68.20	15.00	4.5 COP	7.6	11,876	0	$1,983	$11,200	$500	5.4
Classroom J-106 B HS 9 -10	Classroom J-106 B	1	Water Source HP	6.00	68.20	9.30	1 COP	EDPAC	SEXC 06	B	10	Yes	1	Water Source HP	6.00	68.20	15.00	4.5 COP	7.6	11,876	0	$1,983	$11,200	$500	5.4
Classroom J-107 HS 9 -10	Classroom J-107	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom J-108 HS 9 -10	Classroom J-108	1	Water Source HP	5.00	68.20	9.30	1 COP	EDPAC	SEXC05	B	10	Yes	1	Water Source HP	5.00	68.20	15.00	4.5 COP	8.0	11,648	0	$1,945	$10,800	$300	5.4
Classroom J-109 HS 9 -10	Classroom J-109	1	Water Source HP	5.00	68.20	9.30	1 COP	EDPAC	SEXC 05	B	10	Yes	1	Water Source HP	5.00	68.20	15.00	4.5 COP	8.0	11,648	0	$1,945	$10,800	$300	5.4
Classroom K 102 HS 9 -10	Classroom K 102	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAA HKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom K 103 HS 9 -10	Classroom K 103	1	Water Source HP	5.00	68.20	9.30	1 COP	EDPAC	SEXC 05	B	10	Yes	1	Water Source HP	5.00	68.20	15.00	4.5 COP	8.0	11,648	0	$1,945	$10,800	$300	5.4
Classroom K 105 HS 9 -10	Classroom K 105	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom K 106 HS 9 -10	Classroom K 106	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom K 109 HS 9 -10	Classroom K 109	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom K 110 HS 9 -10	Classroom K 110	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom K 112 HS 9 -10	Classroom K 112	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Area(s)/System(s) Served**	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom K 113 HS 9 -10	Classroom K 113	1	Water Source HP	3.00	68.20	9.50	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom L 102 HS 9 -10	Classroom L 102	1	Water Source HP	3.00	68.20	9.40	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom L 103 HS 9 -10	Classroom L 103	1	Water Source HP	3.00	68.20	9.40	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom L 105 HS 9 -10	Classroom L 105	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 106 HS 9 -10	Classroom L 106	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 109 HS 9 -10	Classroom L 109	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 110 HS 9 -10	Classroom L 110	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 111 HS 9 -10	Classroom L 111	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 112 HS 9 -10	Classroom L 112	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom L 113 HS 9 -10	Classroom L 113	1	Water Source HP	3.00	68.20	9.40	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom H205 HS 9 -10	Classroom H205	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAAHKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom H206 HS 9 -10	Classroom H206	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAAHKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom I201 HS 9 -10	Classroom I201	1	Water Source HP	3.00	68.20	9.60	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom I202 HS 9 -10	Classroom I202	1	Water Source HP	3.00	68.20	9.50	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom I204 HS 9 -10	Classroom I204	1	Water Source HP	3.00	68.20	9.60	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom I205 HS 9 -10	Classroom I205	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I208 HS 9 -10	Classroom I208	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I209 HS 9 -10	Classroom I209	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I210 HS 9 -10	Classroom I210	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1
Classroom I211 HS 9 -10	Classroom I211	1	Split-System Air-Source HP	4.00	48.00	9.30	2.72567409144197 COP	Airedale	CMP	B	10	Yes	1	Split-System Air-Source HP	4.00	48.00	15.50	8.5 HSPF	1.0	634	0	$106	$9,200	$400	83.1

		Existing Conditions									Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom I212 HS 9 -10	Classroom I212	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Office - Faculty J202 B HS 9 -10	Office - Faculty J202 B	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom J 206 HS 9 -10	Classroom J 206	1	Water Source HP	3.00	68.20	9.50	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom J 207 HS 9 -10	Classroom J 207	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom J 209 HS 9 -10	Classroom J 209	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom J 210A HS 9 -10	Classroom J 210A	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAA HKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom J 210B HS 9 -10	Classroom J 210B	1	Water Source HP	3.00	68.20	9.70	1 COP	Airedale	AIREDALE SMG36FAMBAA HKA203	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom J 211 HS 9 -10	Classroom J 211	1	Water Source HP	3.00	68.20	9.60	1 COP	Airedale	SMG	W		No							0.0	0	0	$0	$0	$0	0.0
Classroom J 212 HS 9 -10	Classroom J 212	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Classroom J 213 HS 9 -10	Classroom J 213	1	Water Source HP	4.00	68.20	9.30	1 COP	EDPAC	SEXC 04	B	10	Yes	1	Water Source HP	4.00	68.20	15.00	4.5 COP	8.4	11,419	0	$1,907	$9,400	$300	4.8
Office- Pressbox	Office- Pressbox	4	Unit Heater		17.06		1 COP			W		No							0.0	0	0	$0	$0	$0	0.0

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)	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Core Building- Ground	Core Building Cooling	1	Air-Cooled Screw Chiller	250.00	Trane	RTAC 2504 ULOH VAGN W1TY 1DN	W		No							0.0	0	0	$0	$0	$0	0.0
Core Building- Ground	Core Building Cooling	1	Air-Cooled Screw Chiller	275.00	Trane	RTAC 2754	W		No							0.0	0	0	$0	$0	$0	0.0

Space Heating Boiler 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)	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical 11-12	Heating Whole Building	8	Condensing Hot Water Boiler	2,781	Hydrotherm	KN30	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical room core	Heating Whole Building	2	Non-Condensing Hot Water Boiler	4,100	Bryan	RV500-W-FDG	B	11	Yes	2	Condensing Hot Water Boiler	4,100	93.00%	Ec	0.0	0	552	$7,442	$302,900	$0	40.7

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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Gym Area HS 9-10	Gym Area	12	4.00	55.00	0.00	480.00	0.0	1,538	14	$439	$5,900	$0	13.4
Gym Area HS 11-12	RTU 18-19-22-23 Gym Area	12	6.00	100.00	0.00	2,000.00	0.0	3,014	40	$1,046	$8,800	$0	8.4
Auditorium/Theatre HS 11-12	Auditorium RTU	12	4.00	60.00	0.00	1,200.00	0.0	1,904	24	$644	$5,900	$0	9.2
Theatre Core Building	Air-Cooled Screw Chiller	12	4.00	275.00	0.00	3,000.00	0.0	6,574	72	$2,072	$5,900	$0	2.8

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Room cafe HS 9 -10	DHW kitchen	13	15	1.50	0.0	0	9	$125	$200	$30	1.4

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Electrical Room cafe HS 9 -10	Kitchen 9-10	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	D80T1803N	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical room HS 9 -10	Whole Building 9-10	3	Storage Tank Water Heater (> 50 Gal)	Lochinvar	SNA286-125	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical HS 11-12	Whole Building 11-12	3	Storage Tank Water Heater (> 50 Gal)	Bradford White	EF100T300E3NA2	W		No						0.0	0	0	$0	$0	$0	0.0
Mechaical room Core building	Theatre Core	1	Storage Tank Water Heater (> 50 Gal)	Bradford White	D100T1993N	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
9-10 Building Various	14	7	Faucet Aerator (Kitchen)	2.50	1.50	0.0	0	2	$26	$60	$10	1.9
9-10 Building Classroom	14	10	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	5	$64	$80	$40	0.6
9-10 Building Restrooms	14	37	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	18	$237	$310	$150	0.7
11-12 Building Various	14	24	Faucet Aerator (Kitchen)	2.20	1.50	0.0	0	5	$63	$200	$50	2.4
11-12 Building Restrooms	14	48	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	23	$307	$400	$190	0.7
11-12 Building Locker Room	14	18	Showerhead	2.50	1.50	0.0	0	14	$190	$1,880	$270	8.5
Various- Core building	14	18	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	9	$115	$150	$70	0.7

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions				Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen- 9-10 Building	1	Cooler (35F to 55F)	Heatcraft	ADT130AWMC6K	16, 17	Yes	No	Yes	0.1	1,367	0	$228	$2,810	$160	11.6
Kitchen- 9-10 Building	1	Medium Temp Freezer (0F to 30F)			16, 17	Yes	Yes	Yes	0.1	2,325	0	$388	$3,450	$210	8.3
Kitchen 11-12	1	Cooler (35F to 55F)		RL6A094ADA	16, 17	Yes	No	Yes	0.1	970	0	$162	$2,810	$160	16.4
Kitchen 11-12	1	Low Temp Freezer (-35F to -5F)	Russell	RFH300L44DA	16, 17	Yes	Yes	Yes	0.1	2,900	0	$484	$3,820	$250	7.4
Exterior 9-10 Building	1	Cooler (35F to 55F)	Heatcraft	ADT104AK	16, 17	Yes	No	Yes	0.1	1,291	0	$216	$2,810	$160	12.3
Exterior 9-10 Building	1	Medium Temp Freezer (0F to 30F)	Heatcraft	LET120BK	16, 17	Yes	Yes	Yes	0.1	3,164	0	$528	$3,820	$250	6.8

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen 11-12	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Continental	3RSS	No	18	Yes	0.1	958	0	$160	$2,800	$200	16.3
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)			No	18	Yes	0.1	724	0	$121	$2,100	$100	16.5
Kitchen HS 9 -10	2	Refrigerator Chest			No	18	Yes	0.2	2,048	0	$342	$3,500	$0	10.2
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Glass Door (16 - 30 cu. ft.)	Imbera	VRD37	No	18	Yes	0.1	662	0	$111	$3,000	$100	26.2
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Continental	2R	No	18	Yes	0.1	919	0	$153	$2,700	$100	16.9
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	Turboair	M3-F723N	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Continental	2R-SA-PT	No	18	Yes	0.1	919	0	$153	$2,700	$100	16.9
Kitchen HS 9 -10	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	SABA		No	18	Yes	0.1	470	0	$79	$1,700	$100	20.4
Kitchen HS 9 -11	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Continental	2R-SA-PT	No	18	Yes	0.1	919	0	$153	$2,700	$100	16.9

Commercial Ice Maker Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Ice Maker Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Medical Room 11-12	1	Self-Contained Unit (<175 lbs/day), Batch	Scotsman		No	18	Yes	0.1	568	0	$95	$3,800	$100	39.0
Kitchen HS 9 -10	1	Self-Contained Unit (<175 lbs/day), Batch	Manitowoc		Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen- 9-10 Building	1	Insulated Food Holding Cabinet (Full Size)	CresCor	H135WSUA11R	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen- 9-10 Building	1	Insulated Food Holding Cabinet (Full Size)	CresCor	H135WSUA11R	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen- 9-10 Building	1	Electric Convection Oven (Full Size)	Blodgett	Mark V100	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen HS 11-12	4	Electric Convection Oven (Full Size)	Blodgett	Mark V101	Yes		No	0.0	0	0	$0	$0	$0	0.0
Classroom B20 HS 11-12	1	Insulated Food Holding Cabinet (Full Size)	CresCor	H135WSUA11R	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen HS 11-12	2	Insulated Food Holding Cabinet (Full Size)	CresCor		Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen HS 11-12	1	Electric Steamer	Groen		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen- 9-10 Building	1	Insulated Food Holding Cabinet (Full Size)	Continental		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	Manufacturer	Model	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	Estimated M&L Cost ($)	Total Incentives	Payback w/ Incentives in Years
Kitchen- 9-10 Building	1	Door Type (High Temp)	Insinger	Admiral 66-4	Electric	Electric	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen HS 11-12	1	Door Type (High Temp)	Hobart	CR376A	Electric	Electric	No	15	Yes	1.6	14,143	0	$2,362	$10,800	$700	4.3
Classroom child room 11-12	1	Under Counter (Low Temp)			Electric	None	No		No	0.0	0	0	$0	$0	$0	0.0
Culinary Classroom A-6 HS 11-12	2	Under Counter (Low Temp)	GE	GDF550PSR6SS	Electric	None	No		No	0.0	0	0	$0	$0	$0	0.0
Classroom G104- Core Building	1	Under Counter (Low Temp)	GE	GDF550PSR6SS	Electric	None	No		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?	Manufacturer	Model
Various - HS 11-12	166	Desktops	150	No		
Various - HS 11-12	59	Projector	200	No		
Various - HS 11-12	3	Toaster Oven	850	No		
Various - HS 11-12	39	Television	200	No		
Various - HS 11-12	76	Printer (Medium/Small)	150	No		
Various - HS 11-12	11	Printer/Copier (Large)	600	No		
Various - HS 11-12	22	Microwave	1,000	No		
Classroom A26-11-12	1	Fan (Portable)	100	No		
Classroom A12- 11-12	1	Kiln	10,000	No	Amaco	
Various - HS 11-12	5	Paper Shredder	150	No		
Various - HS 11-12	12	Refrigerator (Mini)	153	No		
Various - HS 11-12	10	Refrigerator (Residential)	218	No		
Various - HS 11-12	3	Serving Table (Chilled/Heated)	1,500	No		
Various - HS 11-12	3	Air Purifier	55	No	Medify Air	MA-112
Various - HS 11-12	8	Residential Oven	1,500	No		
Various - HS 11-12	3	Treadmill	250	No		
Various - HS 11-12	7	Range hood	75	No		
Various - HS 11-12	4	Coffee Machine	900	No		
Various - HS 11-12	6	Clothes Dryer	5,600	No		
Various - HS 11-12	6	Clothes Washer	900	No		
Various HS 9-10	155	Desktops	150	No		
Various HS 9-10	21	Printer (Medium/Small)	150	No		
Various HS 9-10	9	Printer/Copier (Large)	600	No		
Various HS 9-10	60	Projector	200	No		
Various HS 9-10	8	Coffee Machine	900	No		
Storage (Receiving)	1	Fan (Portable)	100	No		
Classroom H206-HS 9-10	1	Kiln	16,000	No	Amaco	
Various HS 9-10	17	Microwave	1,000	No		
Various HS 9-10	2	Paper Shredder	150	No		
Various HS 9-10	9	Refrigerator (Mini)	153	No		
Various HS 9-10	6	Refrigerator (Residential)	218	No		
Kitchen 9-10	1	Serving Table (Chilled/Heated)	1,500	No		
Various HS 9-10	41	Television	200	No		
Various HS 9-10	2	Toaster Oven	850	No		
Classroom H110 HS 9 -10	2	3D Printer	800	No		

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Classroom H111 HS 9 -10	1	Wood carving	746	No		
Classroom H111 HS 9 -10	1	Stationary Cabinet Saw	2,238	No		
Classroom H112 HS 9 -10	1	Epilog Laser Cutting	1,500	No		
Classroom H205 HS 9 -10	2	3D Printer	800	No		
Various HS 11-12	2	Air Purifier	55	No	Medify Air	MA-112
Classroom J210 HS 11-12	2	Air Purifier	55	No	Medify Air	MA-112
Kitchen 1 HS 11-12	1	Mixer/Feeder	1,119	No	Hobart	H 600
Various Core building	16	Television	200	No		
Various Core building	6	Smart Board	160	No		
Classroom Core Building	2	Toaster Oven	850	No		
Various Core building	8	Refrigerator (Residential)	218	No		
Various Core building	10	Refrigerator (Mini)	153	No		
Various Core building	15	Projector	200	No		
Various Office - Core Building	6	Printer/Copier (Large)	600	No		
Various Core building	12	Printer (Medium/Small)	150	No		
Various Core building	1	Paper Shredder	200	No		
Various Core building	12	Microwave	1,000	No		
Various Core building	2	Coffee Machine	900	No		
Various Core building	2	Clothes Dryer	5,600	No		
Various Core building	2	Clothes Washer	900	No		
Classroom G106-Core Building	1	Kiln	16,000	No	Olympic	V6CF
Various Core building	155	Desktops	150	No		
Various Core building	5	Air Purifier	55	No	Medify Air	MA-112
Classroom G104-Core Building	6	Residential Oven/Stove	1,500	No		
Classroom G106-Core Building	9	Pottery Wheels	373	No		
Classroom G212-Core Building	1	Paper Cutter	8,320	No	Challenge	Diamond
Various Core building	3	Laminator	600	No		

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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom B16 HS 11-12	1	Refrigerated	19	Yes	0.2	1,612	0	$269	$270	$50	0.8
Classroom B16 HS 11-12	1	Non-Refrigerated	19	Yes	0.0	343	0	$57	$270	$0	4.7
Various HS 9-10	2	Refrigerated	19	Yes	0.4	3,224	0	$538	$540	$100	0.8
Office-HS -9-10	1	Non-Refrigerated	19	Yes	0.0	343	0	$57	$270	$0	4.7
Corridor Core 1st Floor	1	Non-Refrigerated	19	Yes	0.0	343	0	$57	$270	$0	4.7

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

Energy use intensity (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. NJCEP uses the EPA's ENERGY STAR Portfolio Manager system to generate baseline energy usage results and comparable building EUIs. Portfolio Manager is specifically designed for benchmarking energy consumption within a building.

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

38

ENERGY STAR® Score[1]

Washington Township High School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 450,130
Built: 1961

For Year Ending: March 31, 2023
Date Generated: January 31, 2024

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
Washington Township High School 509 & 529 Hurffville-Cross Keys Road Sewell, New Jersey 08080	Washington Township Board of Education 206 Holly Avenue Sewell, NJ 08080 (856) 589-6644	Janine Wechter 206 Holly Avenue Sewell, NJ 08080 (856) 589-6644 x 6502 jwechter@wtps.org

Property ID: 30742148

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
69.6 kBtu/ft²

Source EUI
139.1 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	16,980,660 (54%)
Natural Gas (kBtu)	14,354,631 (46%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	62.3
National Median Source EUI (kBtu/ft²)	124.4
% Diff from National Median Source EUI	12%

Annual Emissions

Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	2,288

Signature & Stamp of Verifying Professional

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

LP Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer or Registered Architect 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 gas* 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, which 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 (II)	*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 1/8th 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.