Local Government Energy Audit Report

Chemistry, Physics, Mathematics & Chemistry Addition

May 6, 2021

Prepared for:

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Disclaimer

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

TRC reviewed the energy conservation measures and estimates of energy savings 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.

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

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

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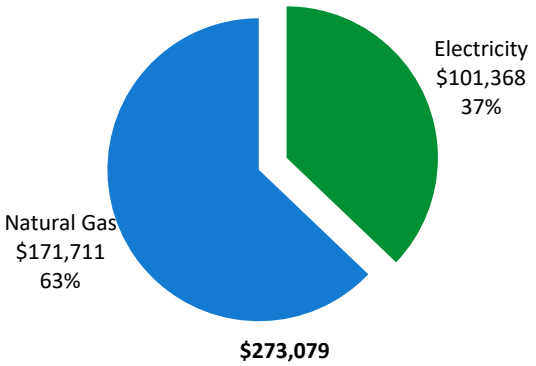
1 EXECUTIVE SUMMARY

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

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $273,079 Electricity: 3,558,182 kWh Natural Gas: 404,756 Therms	
ENERGY STAR® Benchmarking Score	N/A *(1-100 scale)*	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.

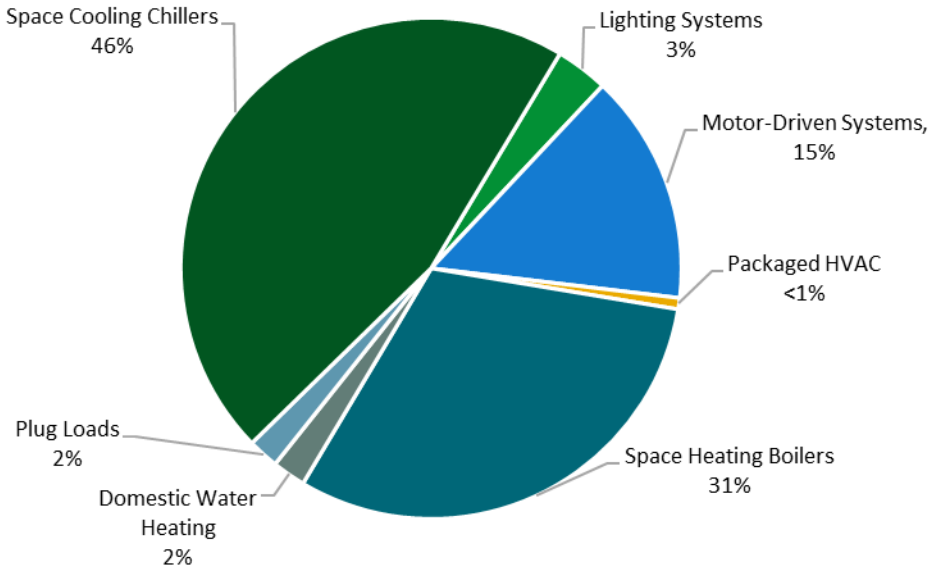


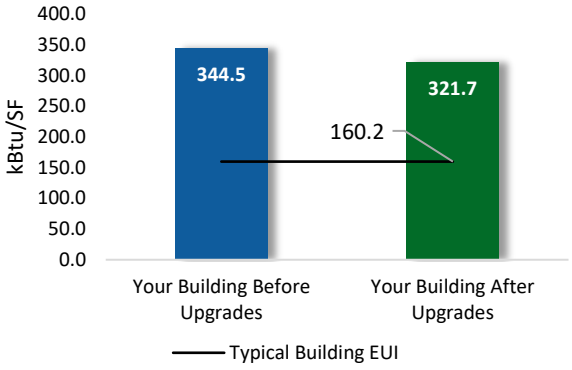
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

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

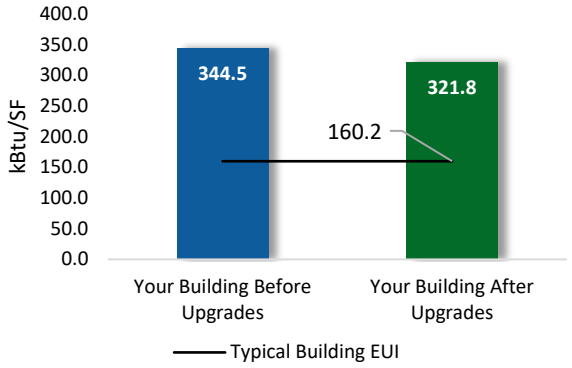
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$327,731
Potential Rebates & Incentives[1]	$39,097
Annual Cost Savings	$116,323
Annual Energy Savings	Electricity: 765,928 kWh Natural Gas: 8,585 Therms
Greenhouse Gas Emission Savings	436 Tons
Simple Payback	2.5 Years
Site Energy Savings (all utilities)	7%



Scenario 2: Cost Effective Package[2]

Installation Cost	$317,345
Potential Rebates & Incentives	$39,097
Annual Cost Savings	$115,645
Annual Energy Savings	Electricity: 761,317 kWh Natural Gas: 8,585 Therms
Greenhouse Gas Emission Savings	434 Tons
Simple Payback	2.4 Years
Site Energy Savings (all utilities)	7%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**239,137**	**24.2**	**-55**	**$34,949**	**$69,828**	**$15,039**	**$54,789**	**1.6**	**234,386**
ECM 1	Install LED Fixtures	Yes	307	0.0	0	$45	$331	$100	$231	5.1	309
ECM 2	Retrofit Fixtures with LED Lamps	Yes	238,830	24.2	-55	$34,903	$69,497	$14,939	$54,558	1.6	234,077
Lighting Control Measures			**65,362**	**6.3**	**-15**	**$9,552**	**$48,033**	**$7,980**	**$40,053**	**4.2**	**64,059**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	60,177	5.8	-14	$8,794	$44,208	$5,655	$38,553	4.4	58,977
ECM 4	Install High/Low Lighting Controls	Yes	5,186	0.5	-1	$758	$3,825	$2,325	$1,500	2.0	5,082
Motor Upgrades			**4,611**	**0.7**	**0**	**$678**	**$10,386**	**$0**	**$10,386**	**15.3**	**4,644**
ECM 5	Premium Efficiency Motors	No	4,611	0.7	0	$678	$10,386	$0	$10,386	15.3	4,644
Variable Frequency Drive (VFD) Measures			**363,052**	**60.7**	**0**	**$53,411**	**$131,999**	**$15,900**	**$116,099**	**2.2**	**365,590**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	29,962	5.3	0	$4,408	$18,644	$2,250	$16,394	3.7	30,172
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	311,380	53.3	0	$45,809	$99,549	$10,750	$88,799	1.9	313,557
ECM 8	Install VFDs on Water Supply Pump	Yes	21,710	2.1	0	$3,194	$13,806	$2,900	$10,906	3.4	21,862
Domestic Water Heating Upgrade			**26,691**	**0.0**	**0**	**$3,927**	**$229**	**$128**	**$101**	**0.0**	**26,878**
ECM 9	Install Low-Flow DHW Devices	Yes	26,691	0.0	0	$3,927	$229	$128	$101	0.0	26,878
Food Service & Refrigeration Measures			**1,209**	**0.1**	**0**	**$178**	**$230**	**$50**	**$180**	**1.0**	**1,217**
ECM 10	Vending Machine Control	Yes	1,209	0.1	0	$178	$230	$50	$180	1.0	1,217
Custom Measures			**65,866**	**0.0**	**928**	**$13,628**	**$67,025**	**$0**	**$67,025**	**4.9**	**175,026**
ECM 11	Retro-Commissioning Study	Yes	48,075	0.0	807	$10,497	$45,825	$0	$45,825	4.4	142,932
ECM 12	Sub Metering	Yes	17,791	0.0	121	$3,131	$21,200	$0	$21,200	6.8	32,093
TOTALS (COST EFFECTIVE MEASURES)			**761,317**	**91.3**	**858**	**$115,645**	**$317,345**	**$39,097**	**$278,248**	**2.4**	**867,156**
TOTALS (ALL MEASURES)			**765,928**	**92.0**	**858**	**$116,323**	**$327,731**	**$39,097**	**$288,634**	**2.5**	**871,800**

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

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

Figure 2 – Evaluated Energy Improvements

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

1.1 Planning Your Project

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

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

Pick Your Installation Approach

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

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

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X		X
ECM 2	Retrofit Fixtures with LED Lamps	X		X
ECM 3	Install Occupancy Sensor Lighting Controls	X		X
ECM 4	Install High/Low Lighting Controls	X		X
ECM 5	Premium Efficiency Motors			X
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	X		X
ECM 7	Install VFDs on Constant Volume (CV) Fans	X		X
ECM 8	Install VFDs on Water Supply Pump	X		X
ECM 9	Install Low-Flow DHW Devices	X		X
ECM 10	Vending Machine Control	X		X
ECM 11	Retro-Commissioning Study			
ECM 12	Sub Metering			

Figure 3 – Funding Options

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

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Incentives are paid out in three installments. The first installment is meant to help offset the costs of the initial engineering study. The subsequent incentives are paid based on the level of energy savings up to 50% of the total project cost. See Section 7.3 for all incentive details.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

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

Individual Measures with SmartStart

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

Turnkey Installation with Direct Install

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

Whole Building Approach with Pay for Performance

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

More Options from Around the State

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

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

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

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

Ongoing Electric Savings with Demand Response

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

2 EXISTING CONDITIONS

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

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

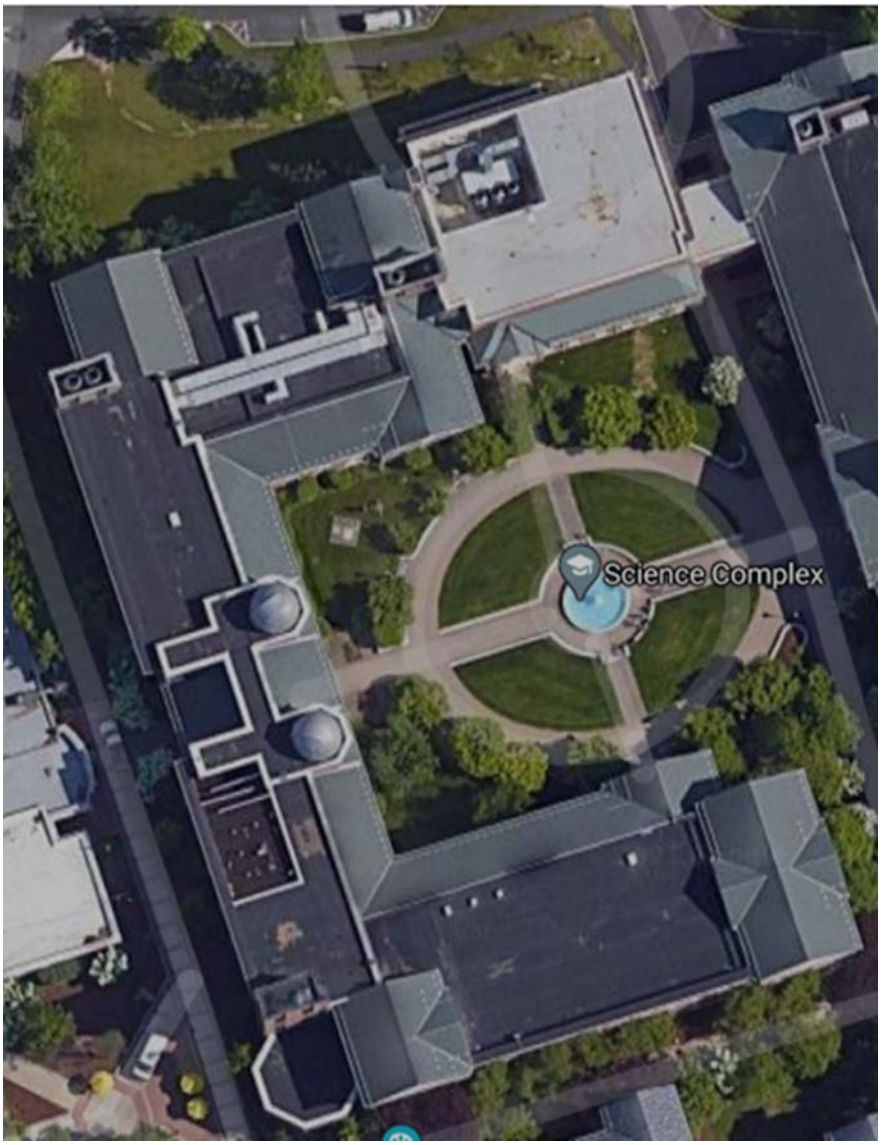
2.1 Site Overview

On October 21, 2020, TRC performed an energy audit at Chemistry, Physics, Mathematics & Chemistry Addition located in Ewing, New Jersey. TRC met with Benedictus Paraan to review the facility operations and help focus our investigation on specific energy-using systems.

The Chemistry, Physics, Mathematics & Chemistry Addition with Biology building at TCNJ are formerly known as Science Complex. The Chemistry, Physics and Mathematics building is a 4-story 123,068 square foot building built in 2002. The Chemistry Addition is a 3-story 29,681 square foot building built in 2018 to accommodate additional laboratory spaces. Spaces include classrooms, laboratories, administrative offices, study rooms, lobbies, corridors, planetarium, stairs, restrooms, closets, attic, storage rooms, and electrical and mechanical spaces.

Lighting is provided by a combination of LED fixtures and linear fluorescent T8 lamps. The facility uses steam and chilled water supplied from the Powerhouse/Cogen building or Central Utilities Plant (CUP). There are several air handling units (AHUs) and heating and ventilation units (HV) that provide heating and cooling to spaces. There are two passenger elevators in the building.

The Chemistry Addition (CA) building is equipped with sub meters that track the cooling and heating energy consumed by the building systems. Because this is a relatively new building with highly efficient systems, only limited potential energy savings was projected for this building. The projected energy savings are mainly coming from the Chemistry, Physics and Mathematics (CPM) building.



Aerial View - CPM (Back Roof) & CA (White Roof)

2.2 Building Occupancy

The facility operates on a 10-month schedule. Weekend and summer occupancies vary. The entire facility is shut down at approximately 11:00 PM. During a typical day, the facility is occupied by approximately 2,023 students and 167 staff. It should be noted that the energy and economic analysis for this building is based on the use of the building during the utility billing period, and that results will vary based on changes to building use.

Building Name	Weekday/Weekend	Operating Schedule
Chemistry, Physics, Mathematics & Chemistry Addition	Weekday	7:00 AM - 11:00 PM
	Weekend	Varies
	Summer	Varies

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are made of concrete block over structural steel with brick veneer façade. The main center flat roofs are supported with steel trusses, a concrete deck, and finished with a thermoplastic white membrane (CA building) and black membrane (CPM building). The center flat roofs are surrounded with perimeter clay tile pitched roofing. The roofing systems are in good condition.

The windows are double glazed and have aluminum frames with a fiberglass thermal break. The glass-to-frame seals are in good condition. The fixed window weather seals are in good condition, showing no signs of outside air infiltration. The entrance doors are fully glazed with aluminum frames. The exit doors are made of metal frames and are in good condition. Overall, the building envelope appears in good condition.

Walls - (CPM) & (CA) Buildings

Roofs - CPM Building

Entrance Doors & Window – CPM Building

Window & Hallway - CA Building

2.4 Lighting Systems

Interior lighting is mainly provided by a combination of LED fixtures and linear fluorescent fixtures with 32-Watt T8 lamps and electronic ballasts. Additionally, there are several compact fluorescent lamps (CFL).

Fixture types include 2-lamp, 4-foot long troffer, recessed, pendant, surface mounted, and 2-foot fixtures with U-bend tube lamps. The CA building lighting, except the basement spaces, is provided by LED fixtures. Several Physics Department administrative offices, research laboratories, and the Chemistry Department main lobby are also illuminated with LED fixtures. The classrooms, research laboratories, hallways, basement spaces, mechanical and electrical rooms, lobbies, restrooms, and storage rooms are illuminated with fluorescent T8 fixtures. The recessed CFL lamps are used in combination with linear T8 fixtures in several office and lobby spaces.

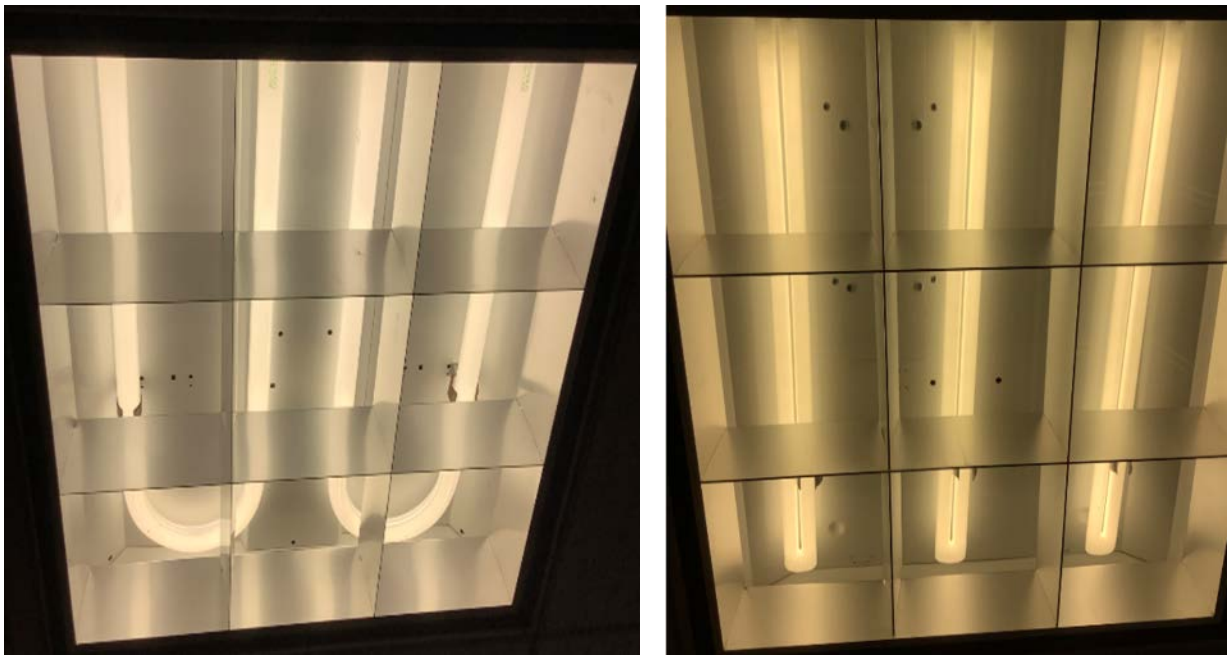
Most light fixtures are in good condition. Exit signs throughout the building are LED fixtures. Interior lighting levels were generally sufficient. Light fixtures in spaces are controlled by both manual wall mounted switches and ceiling mounted occupancy sensors.

Exterior fixtures include 30-Watt pole mounted LED fixtures, wall-mounted LED and CFL fixtures, and two wall mounted fixtures with metal halide lamps. Exterior fixtures are controlled by timeclocks.

Linear Fluorescent T8 Fixtures

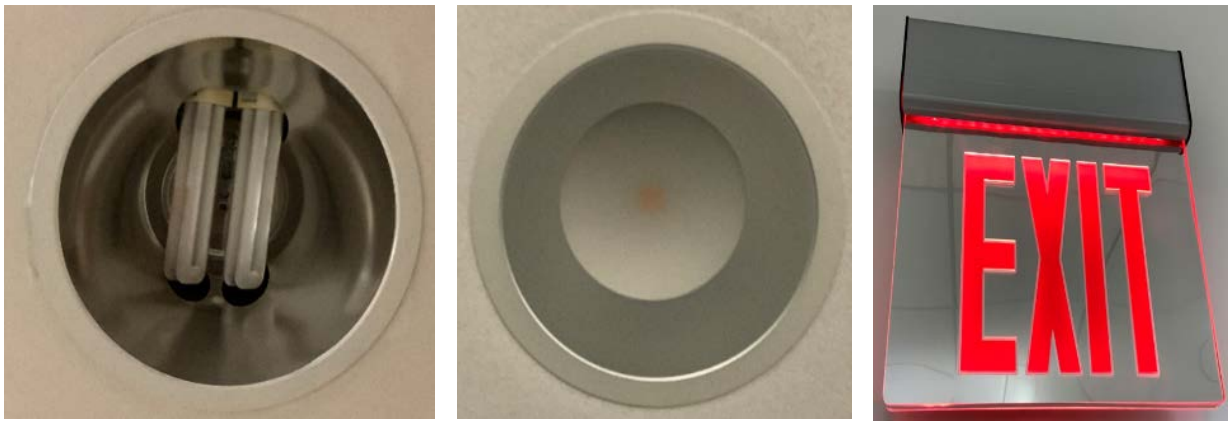
Linear T8 & LED Fixture

2-Foot LED Fixtures



2-Foot Fluorescent & CFL Fixtures

CFL & LED Fixtures



Recessed CFL, LED Fixtures & LED Exit Sign

Ceiling Mounted Occupancy Sensors & Wall Switches

Exterior Fixtures

2.5 Air Handling Systems

Unitary Electric HVAC Equipment

The electrical room, IT, and rooms C130E, C130F, C033 are conditioned using 1.5-ton Daikin direct expansion ductless mini split air conditioners. The units are in good condition and are controlled by programmable thermostats.

Daikin Ductless Split AC & Programmable Thermostat

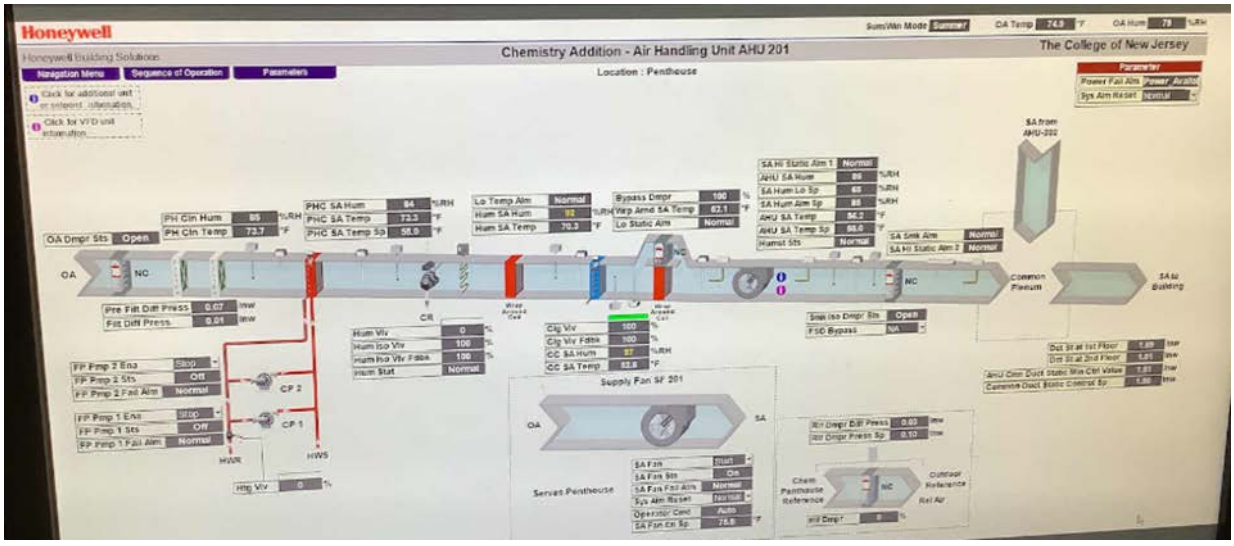
Fan Coil Units

The pump room (034) in the Chemistry Addition is cooled using a fan coil unit that is equipped with a supply fan motor and a digitally controlled fan coil valve. The unit is new and in good condition.

Air Handling Units (AHUs)

The Chemistry Addition (CA) laboratories and support spaces are served by two AHUs (AHU-201 and 202). These units provide variable air volume at constant pressure with pressure independent terminal units and are classified for 100 percent outdoor air capacity. Each unit contains hydronic preheat coils, chilled water coils, hot water coils, a supply fan motor, and unfired steam humidifiers. They are scheduled to operate 24 hours a day. The supply ductwork manifold is configured such that both units normally operate at the same time in parallel. When one unit is shut down automatically due to a failure, the other unit will provide limited capacity to meet the system demand. The two AHUs are interlocked with ERU-200 exhaust fans (EF-201A, 201B, and 201C) as described below. They are located in the penthouse.

Air distribution is provided to supply air registers by ducts concealed above the ceilings. Heated and cooled air is distributed through ducts to variable air volume (VAV) terminals concealed above the ceilings. The AHUs are controlled by the facility energy management system (EMS).



EMS Screenshot - AHU-201

The Physics and Mathematics offices, as well as the common areas (1st, 2nd, and 3rd floors) are served by two AHUs (AHU-1 and 2). Each unit contains chilled water coils, steam coils, an economizer, and supply and return fan motors. Units are scheduled to operate continuously, and there is a return ductwork manifold on each floor. The supply fan variable speed drives modulate to maintain duct static pressure. The winter and summer setpoints are set at 55°F, and the highest discharge air temperature is set at 66°F. The cooling and heating unoccupied mode are respectively 78°F and 65°F. In an unoccupied mode, the fans are de-energized. However, if lowest temperature of spaces served falls below the night setpoint, the unit fans will be started. AHU-1 is located in the basement mechanical spaces while AHU-2 is in the 3rd floor mechanical room.

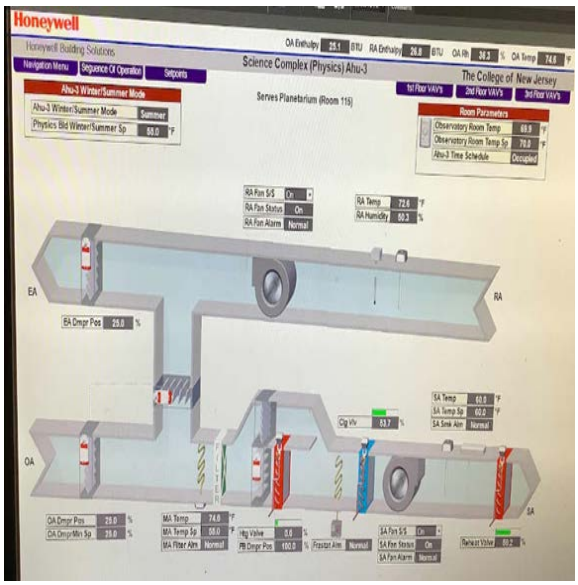
The Chemistry spaces (1st, 2nd, and 3rd floors) are served by two AHUs that are paired together (AHU-4 and 5) and located in mechanical room C311. The units provide variable air volume at constant pressure with pressure independent terminal units and are classified for 100 percent outdoor air capacity. Each unit contains chilled water coils for cooling, steam coils for heating, and a 100 hp variable speed supply fan. The heating control is enabled at 60°F and the winter and summer setpoints are set at 55°F.

AHU-2 & AHU-4

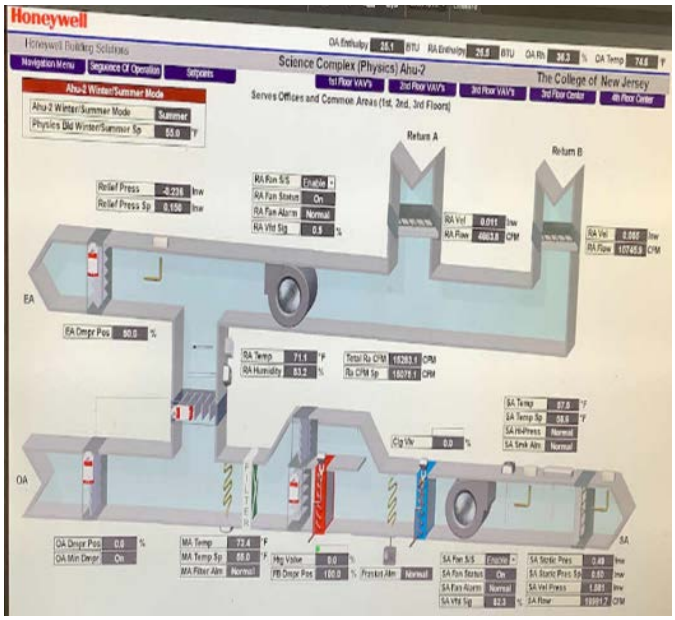
The Planetarium (room 115) is served by AHU-3 located in the 3rd floor mechanical space. The unit contains hydronic preheat coils, chilled water coils, hot water coils, supply and return fan motors, and an economizer. The highest discharge air temperature is set at 60°F. The cooling and heating unoccupied mode are respectively 85°F and 65°F.

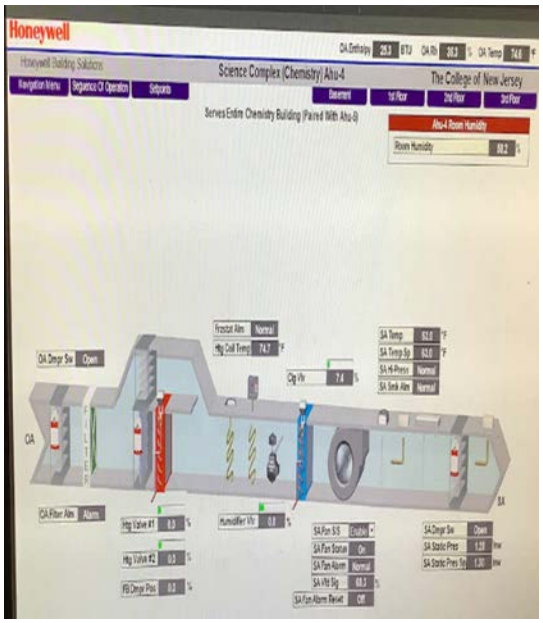
Air distribution to the Chemistry, Physics and Mathematics building spaces is provided to supply air registers via ducts concealed above the ceilings. Heated and cooled air is distributed through ducts to variable air volume (VAV) terminals, also concealed above the ceilings. The AHUs are controlled by the facility energy management system (EMS).

The basement mechanical spaces are heated using two heating and ventilation units (HV-1 and 2). They are equipped with steam coils and a constant speed supply fan motor. The mechanical room temperature setpoint is 68°F. The units are scheduled to run continuously and are controlled by the EMS.

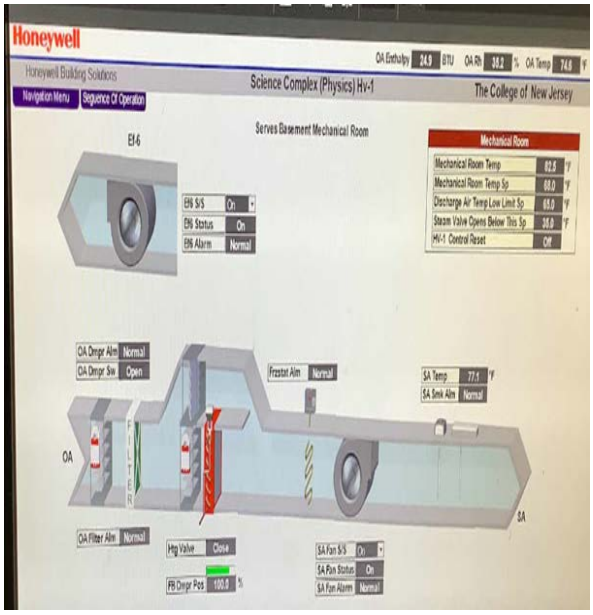


AHU-1 and EMS Screenshot (AHU-3)





EMS Screenshot - AHU-2 & AHU-4



HV-1

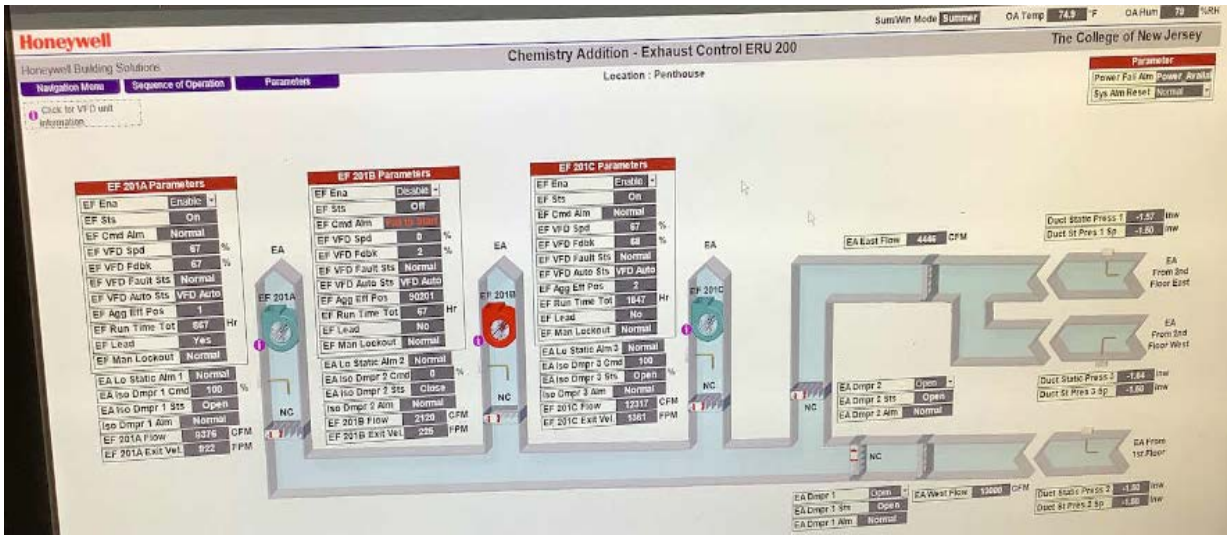
General Building Exhaust Air System

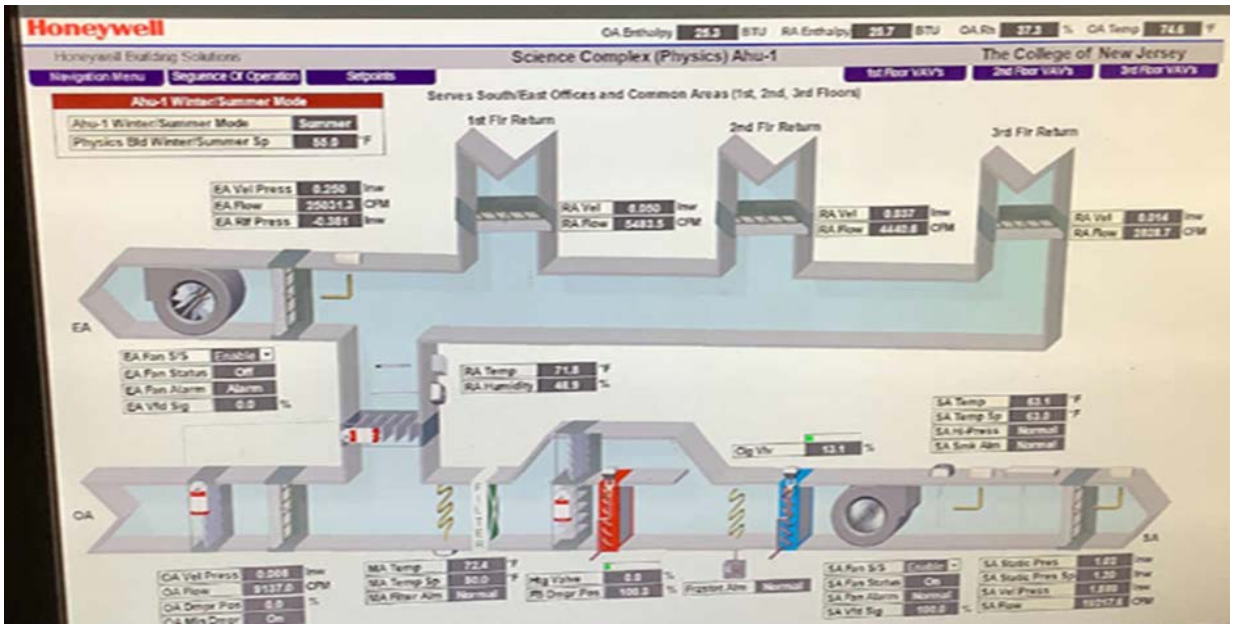
There are various general exhaust fans and fume hoods, which serve laboratories, restrooms, and other spaces.

The electrical room (001) and pump room (002) of the Chemistry Addition have respectively one and two exhaust fans. Exhaust fan 204 serves the Chemistry Addition and follows the AHU-201 and 202 occupancy schedule. It is shutdown during occupied periods. There are three larger exhaust fans (EF-201A, 201B and 201C) physically located in the penthouse. They are interlocked with the energy recovery unit ERU-200 and the fan motors are equipped with VFDs. They normally operate anytime the AHU-201 and 202 are operational.

Air is exhausted in the Chemistry, Physics and Mathematics (CPM) complex using several exhaust fans located in the third-floor storage room, basement mechanical spaces, and attic floor. Additionally, the Chemistry laboratories are served by three larger fume hoods (LEF #1, #2 and #3) located in the roof. Each fan has a self-contained isolation damper that will close when the fan is off and fully open when it is started. The fans operate in a lead/lag scheme. The selection of the lead fan is automatic via a weekly alternation schedule programmed into the EMS, or it can be manually overridden. Once the lead fan starts, it will operate continuously until the end of the weekly cycle when the new lead fan takes over. The changeover occurs at night when the systems are least used.

The exhaust air system is controlled via the EMS.





CA & CPM Larger Exhaust Fans

EF-2 & 6 At CPM

2.6 Steam System

Steam is supplied by boilers and the cogeneration heat recovery system located in the Powerhouse/Cogen Building. Steam is used in this building to produce space heating water and domestic hot water through steam heat exchangers.

The Chemistry Addition has two heat exchangers (HX-201 and 202). The hot water system is designed such that one heat exchanger will operate at a time during hot water system operation. Duty heat exchanger rotation is performed automatically. There is a pressure induced condensate pump. Space heating water is circulated to AHU-201 and 202, hydronic unit heaters, and baseboards using two 10 hp variable flow main loop pumps (HWP 201 and HWP 202). The hot water distribution system is 2-pipe heating only. The hot water system is designed such that one hot water pump will operate at a time during hot water system operation. Pumps operate in a duty/standby arrangement.

The hot water supply temperature is controlled to maintain 160°F when the outside temperature is below 60°F and this setpoint is reset to 180°F when the outside temperature is below 20°F. A flow transmitter and BTU meter are used to measure the hot water energy usage of the Chemistry Addition building.

The Chemistry, Physics and Mathematics building has two heat exchangers (HX-1 and 2). The hot water system is designed such that one heat exchanger will operate at a time during hot water system operation. Duty heat exchanger rotation is performed automatically. There are several pressure induced condensate pumps. Space heating water is circulated to fan coils, cabinet and hydronic unit heaters, and baseboards using two 10 hp variable flow pumps (HWP-1 and 2). The hot water distribution system is 2-pipe heating only. The hot water pumps operate on a lead/lag schedule.

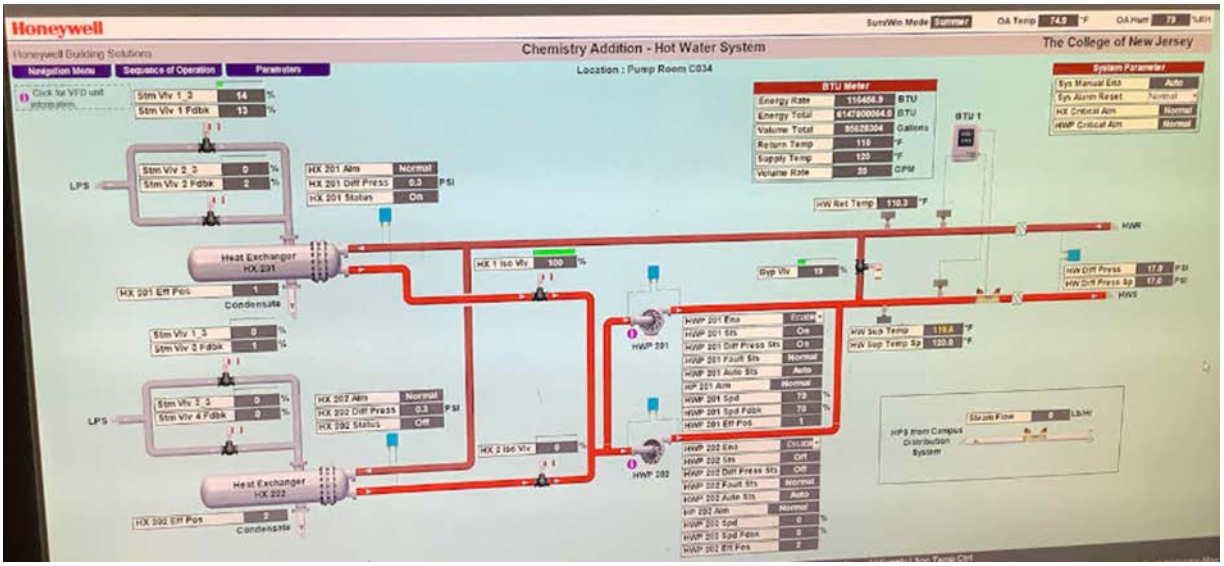
During the day, the hot water supply temperature is controlled to maintain 125°F when the outside temperature is at 60°F and the setpoint is reset to 180°F when the outside temperature is below 20°F. At night, the hot water supply temperature is controlled to maintain 110°F when the outside temperature is at 60°F and this setpoint is reset to 180°F when the outside temperature is below 20°F. Hot water pipes are insulated and the insulation varies from fair to good condition.

Energy use associated with producing steam was allocated to individual buildings served by the cogeneration system and boilers. Please see the Powerhouse/Cogen building report for details regarding the steam system.

Heat Exchangers - CA & CPM Buildings

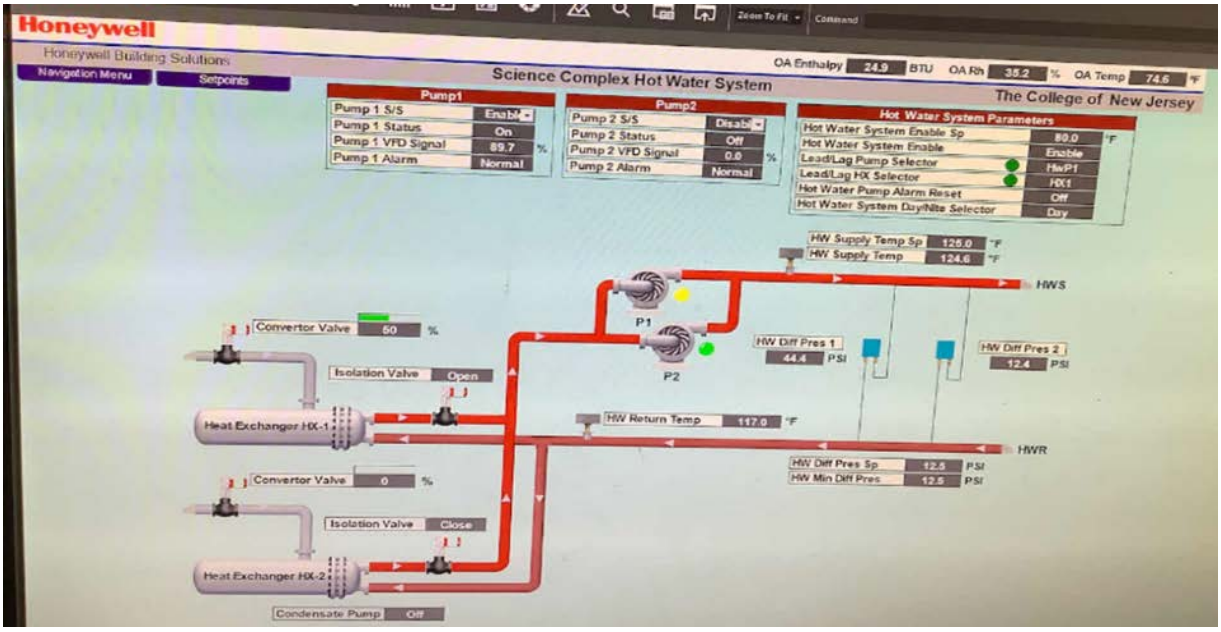
Induce Pressure Condensate Pumps

Hot Water Pumps & VFDs - CA Building



EMS Screenshot - CA Hot Water System

Hot Water Pumps & VFDs - CPM Building



EMS Screenshot - CPM Hot Water System

2.7 Chilled Water Systems

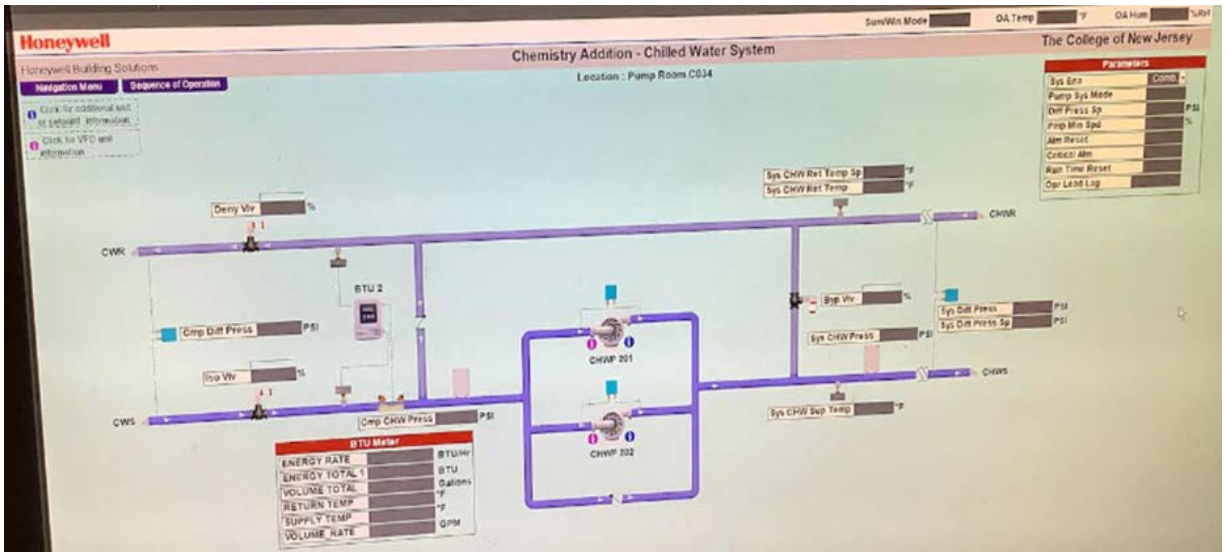
Chilled water is supplied by chillers located in the Powerhouse/Cogen Building. Energy use associated with the steam engine and electric chillers used to produce chilled water was allocated to the individual buildings served by the chiller plant.

Chilled water is circulated to AHUs at the Chemistry Addition building using three 15 hp variable flow pumps (CHWP-201 and 202). They operate in a lead/lag/standby scheme with one pump normally operating and one in standby. The chilled water system is designed to maintain the supply temperature at 47°F and the return leaving temperature at 57°F. A flow transmitter and BTU meter are used to measure the building chilled water energy usage. The chilled water distribution system is 2-pipe cooling only.

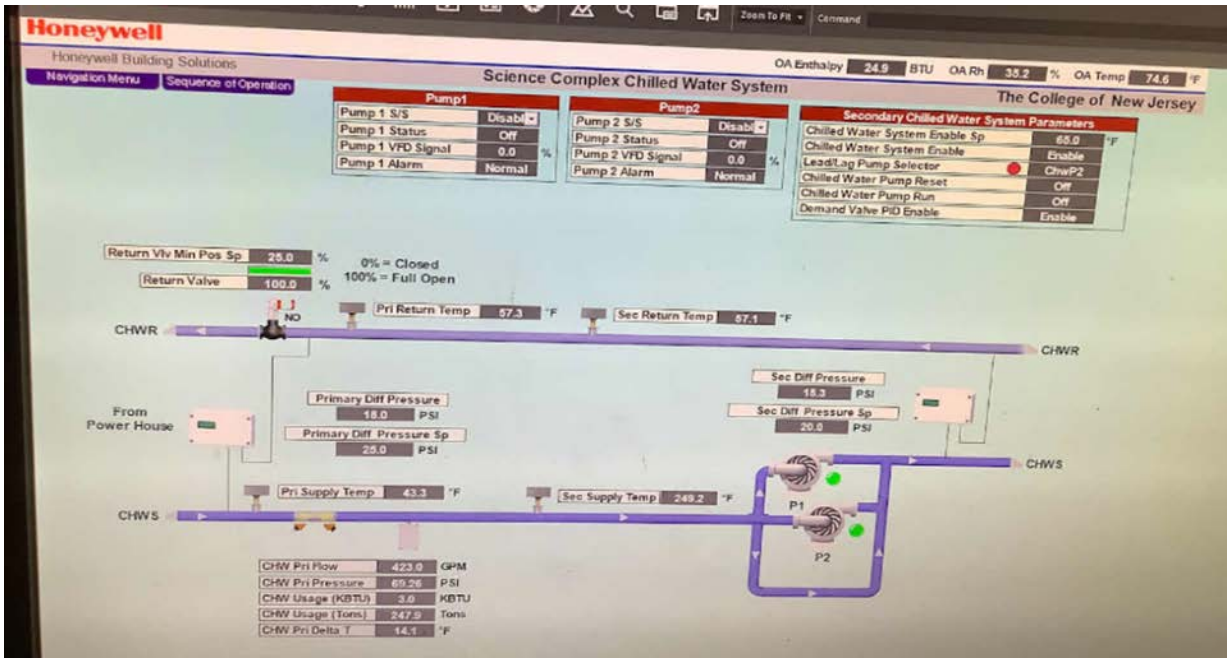
The Chemistry, Physics and Mathematics building has two 50 hp variable flow pumps (P1 and P2) that circulate chilled water to AHUs. They operate in a lead/lag/standby scheme with one pump normally operating and one in standby. The chilled water system OSA enable temperature is 65°F. The pumps are in good condition. The pipes and the insulations are also in good condition.

Please see the Powerhouse/Cogen Building report for details regarding the chiller plant.

Chilled Water Pumps - CA & CPM Buildings



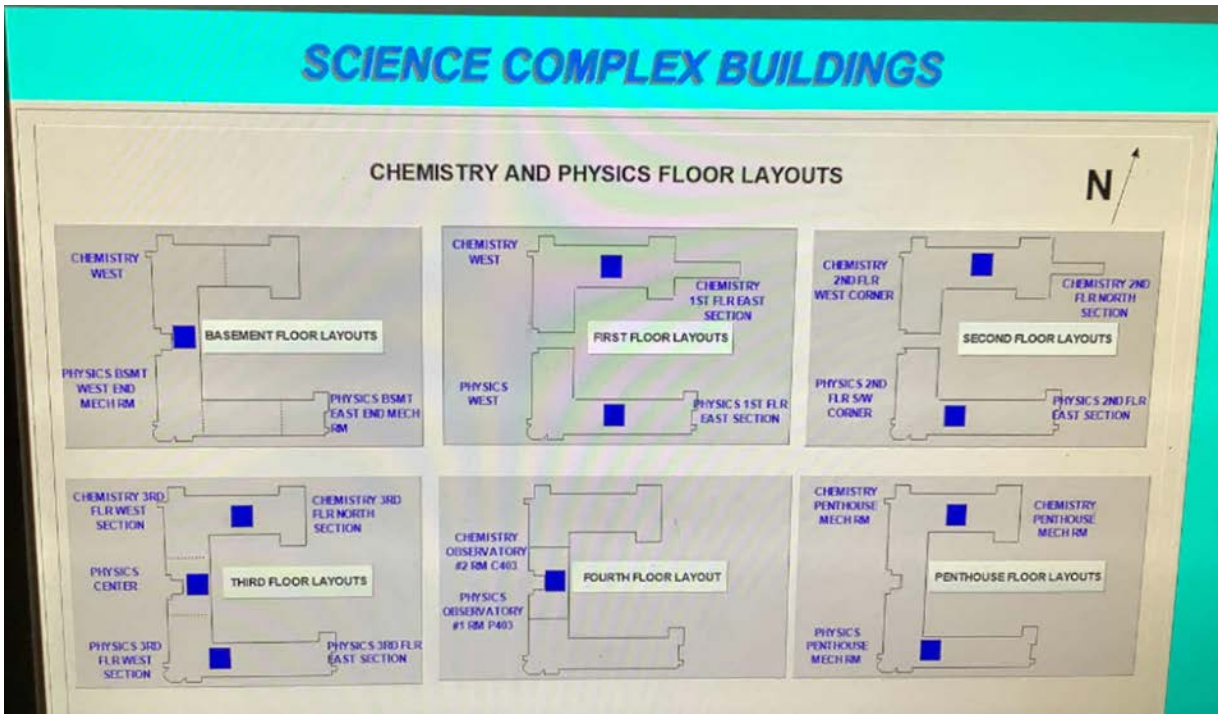
EMS Screenshot - CA Building Chilled Water System



EMS Screenshot - CPM Chilled Water System

2.8 Building Energy Management Systems (EMS)

A Honeywell EMS controls the HVAC equipment, boilers, chillers, and air handlers. The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures.



Science Complex Buildings EMS Layouts

2.9 Domestic Hot Water

Hot water at the Chemistry Addition is produced by two 65 gallon and two 119-gallon, 12 kW electric storage tank water heaters, which are located in the pump room 003.

Hot water is produced at the Chemistry, Physics and Mathematics building by semi-instantaneous indirect water heaters via heat exchangers using low pressure steam from the Powerhouse/Cogeneration. Two 7.5 hp and one 5 hp constant flow booster pumps (P-1, 2, and 3) are used to supply domestic cold water to the building.

The domestic hot water pipes are insulated, and the insulation is in good condition.

Electric Storage Tank Water Heaters

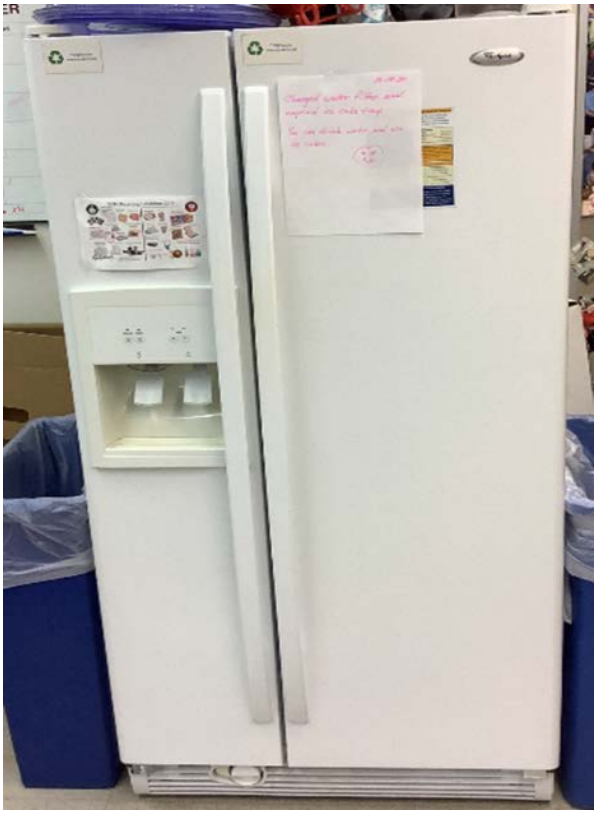
Domestic Cold Water Booster Pumps

2.10 Plug Load & Vending Machines

There are approximately 369 computer workstations throughout the facility. Plug loads in the building include general café and office equipment. There are classroom typical loads such as smart boards and projectors.

There are several residential style refrigerators throughout the building. Additionally, there are several laboratory refrigerators and freezers that are used to store non-volatile reagents and other specimens at various temperatures. There are also typical office loads such as copiers, small printers, televisions, microwaves, water coolers, coffee machines, mini fridges, and several types of laboratory equipment.

There is one refrigerated beverage vending machine and one non-refrigerated vending machine located in the corridor of the CA building. Vending machines are not equipped with occupancy-based controls.



Copier & Residential Style Refrigerator

Laboratory Freezers & Mini-Refrigerators

Laboratory Refrigerator & Vending Machines

2.11 Water-Using Systems

There are several restrooms with toilets, urinals, and sinks at the Chemistry, Physics and Mathematics building. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.5 gpf.

The Chemistry Addition has restrooms with toilets, urinals, and sinks that have low flow devices.

Typical Sink Flow - CPM Building

2.12 Process Equipment

The Chemistry, Physics and Mathematics building process equipment includes vacuum and compressed air and laboratory water filtration systems located in the basement mechanical spaces.

The equipment includes a medical compressed air system, comprised of two 15 hp pumps and a single tank. The pumps run in a lead/lag scheme. The lead pump was running regularly.

A medical vacuum system, consisting of two 7.5 hp pumps and a single tank, is designed to provide a vacuum source for laboratories and other operations that require a reliable, proven vacuum system.

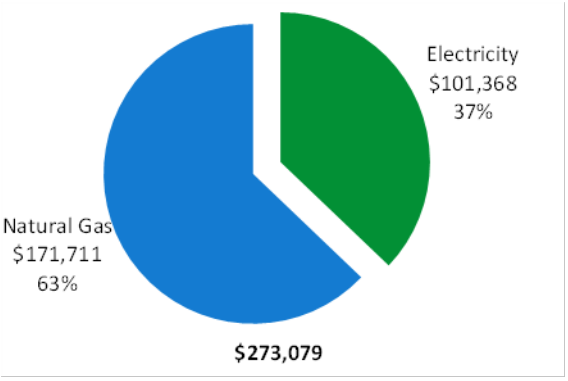
Additionally, there is a two 2 hp single tank Honeywell control compressor. The compressors and the associated piping that provides the compressed air to the end uses are in good condition.

Honeywell & Medical Vacuum Compressors

3 Energy Use and Costs

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

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	3,558,182 kWh	$101,368
Natural Gas	404,756 Therms	$171,711
Total		**$273,079**



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

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

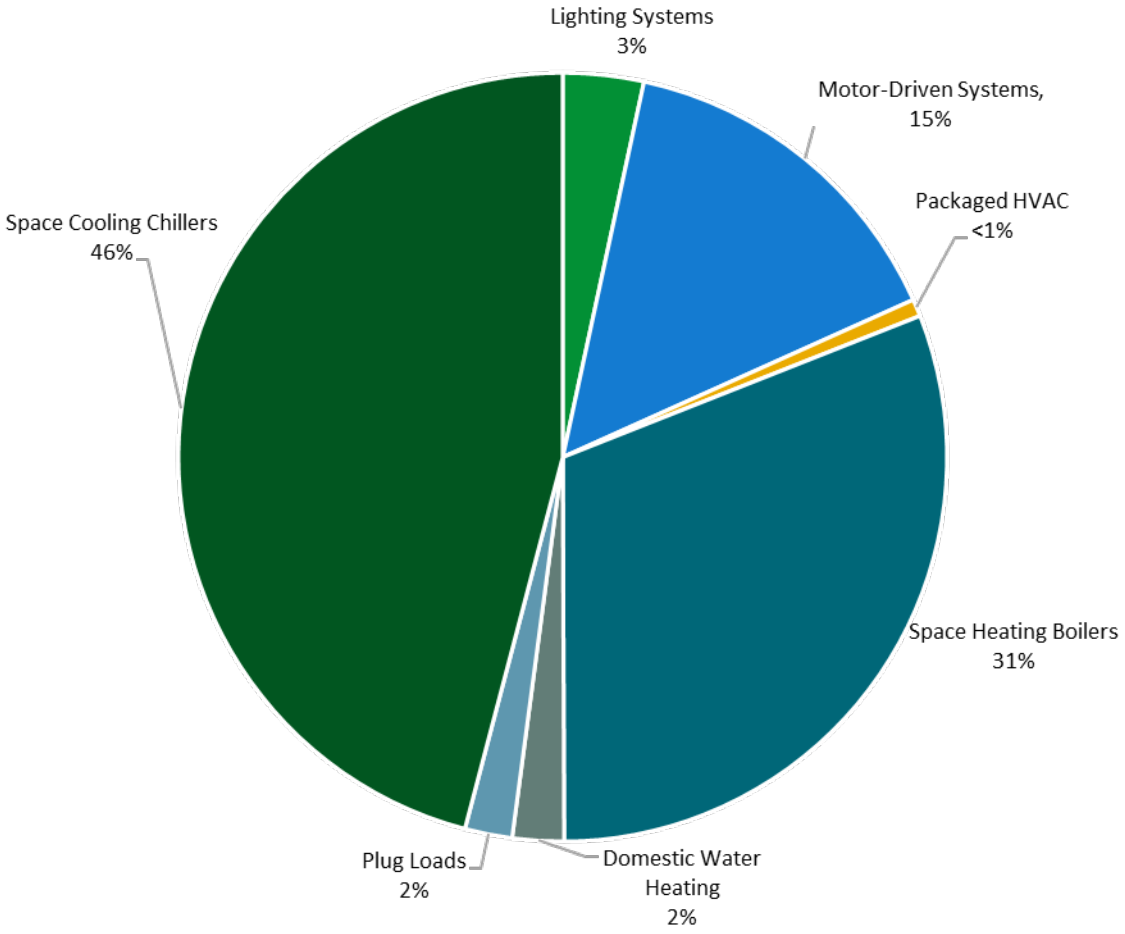
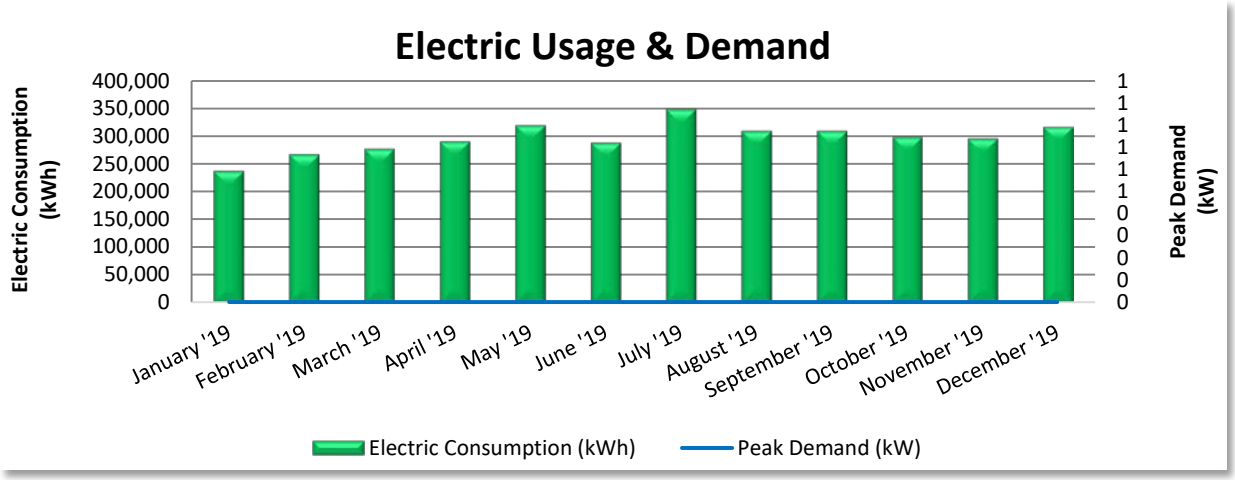


Figure 5 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class High Tension Service (HTS). Electricity for the building is supplemented by the cogeneration plant.



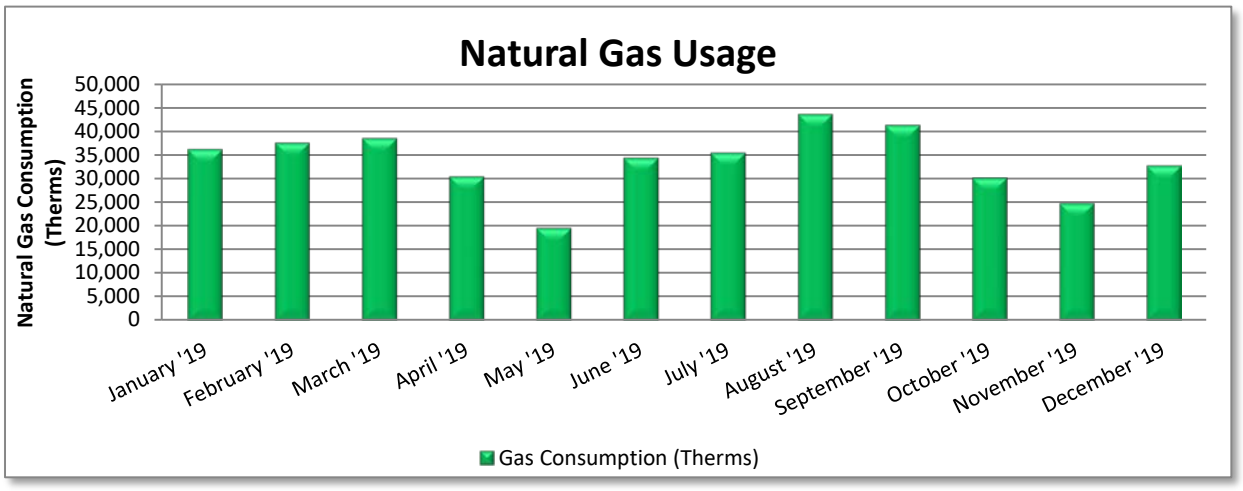
Electric Billing Data						
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**	**TRC Estimated Usage?**
1/28/19	31	236,983	0	$0	$5,172	Yes
2/28/19	31	267,474	0	$0	$6,581	Yes
3/28/19	28	276,697	0	$0	$6,015	Yes
4/28/19	31	290,713	0	$0	$6,543	Yes
5/29/19	31	319,276	0	$0	$11,773	Yes
6/27/19	29	288,491	0	$0	$9,168	Yes
7/29/19	32	348,320	0	$0	$12,556	Yes
8/27/19	29	309,386	0	$0	$8,784	Yes
9/26/19	30	309,218	0	$0	$9,618	Yes
10/25/19	29	298,813	0	$0	$8,293	Yes
11/25/19	31	295,976	0	$0	$7,151	Yes
12/11/19	33	316,835	0	$0	$9,715	Yes
Totals	**365**	**3,558,182**	**0**	**$0**	**$101,368**	
Annual	**365**	**3,558,182**	**0**	**$0**	**$101,368**	

Notes:

- Electric data has been estimated based on a campus wide approach and utilization of sub metered data. Please refer to the Powerhouse/Cogen Building report for details regarding utility baseline and campus building utility desegregation.
- The peak demand for this facility was unavailable because the building is served with electricity from the master meter.
- The average purchased electric cost over the past 12 months was $0.147/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.
- Effectively all of the electricity generated on-site is used on-site.

3.2 Natural Gas

PSE&G delivers natural gas for the main boiler meter under rate class TSGNF.



Gas Billing Data				
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**	**TRC Estimated Usage?**
1/28/19	31	36,172	$13,605	Yes
2/28/19	31	37,605	$17,927	Yes
3/28/19	28	38,534	$17,330	Yes
4/28/19	31	30,439	$12,778	Yes
5/29/19	31	19,586	$8,507	Yes
6/27/19	29	34,389	$14,869	Yes
7/29/19	32	35,433	$14,364	Yes
8/27/19	29	43,577	$17,105	Yes
9/26/19	30	41,314	$16,572	Yes
10/25/19	29	30,201	$12,932	Yes
11/25/19	31	24,796	$10,980	Yes
12/11/19	33	32,710	$14,742	Yes
Totals	**365**	**404,756**	**$171,711**	
Annual	**365**	**404,756**	**$171,711**	

Notes:

- Natural gas data has been estimated based on a campus wide approach. Please refer to the Powerhouse/Cogen Building report for details regarding the utility baseline and campus building utility desegregation analysis.
- The average gas cost for the past 12 months is $0.424/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

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

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

Benchmarking Score	**N/A**

Due to its unique characteristics, this building type is not able to receive a benchmarking score. This report contains suggestions about how to improve building performance and reduce energy costs.

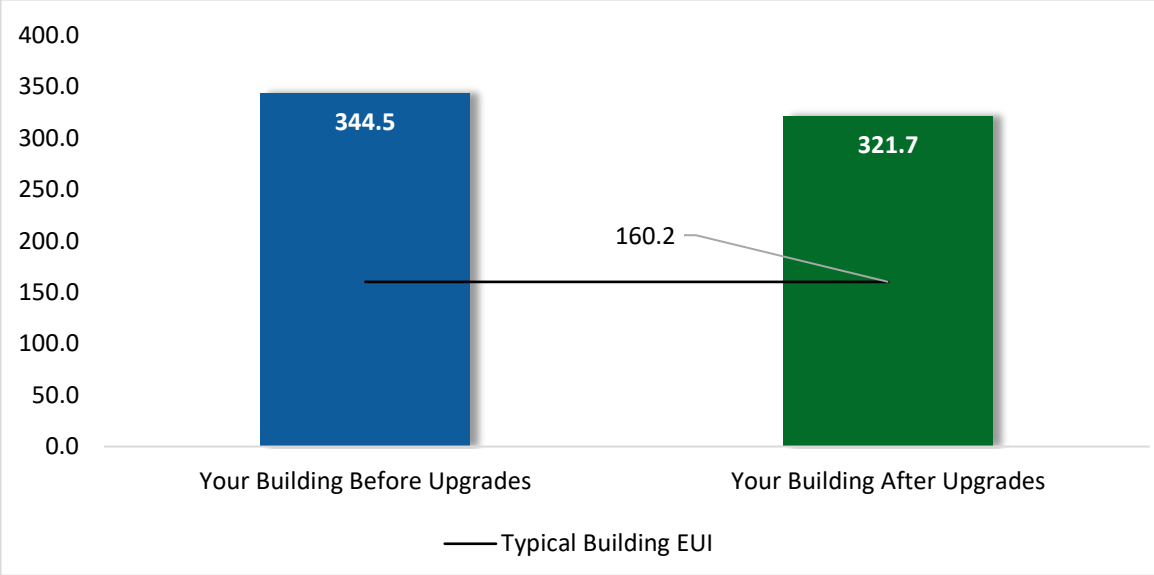


Figure 6 - Energy Use Intensity Comparison[3]

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

Benchmarking is provided for The College of New Jersey's campus. Please refer to the Powerhouse/Cogen report for additional details regarding the benchmarking approach within Portfolio Manager®.

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

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

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

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

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

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

4 ENERGY CONSERVATION MEASURES

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

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

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

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

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

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**239,137**	**24.2**	**-55**	**$34,949**	**$69,828**	**$15,039**	**$54,789**	**1.6**	**234,386**
ECM 1	Install LED Fixtures	Yes	307	0.0	0	$45	$331	$100	$231	5.1	309
ECM 2	Retrofit Fixtures with LED Lamps	Yes	238,830	24.2	-55	$34,903	$69,497	$14,939	$54,558	1.6	234,077
Lighting Control Measures			**65,362**	**6.3**	**-15**	**$9,552**	**$48,033**	**$7,980**	**$40,053**	**4.2**	**64,059**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	60,177	5.8	-14	$8,794	$44,208	$5,655	$38,553	4.4	58,977
ECM 4	Install High/Low Lighting Controls	Yes	5,186	0.5	-1	$758	$3,825	$2,325	$1,500	2.0	5,082
Motor Upgrades			**4,611**	**0.7**	**0**	**$678**	**$10,386**	**$0**	**$10,386**	**15.3**	**4,644**
ECM 5	Premium Efficiency Motors	No	4,611	0.7	0	$678	$10,386	$0	$10,386	15.3	4,644
Variable Frequency Drive (VFD) Measures			**363,052**	**60.7**	**0**	**$53,411**	**$131,999**	**$15,900**	**$116,099**	**2.2**	**365,590**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	Yes	29,962	5.3	0	$4,408	$18,644	$2,250	$16,394	3.7	30,172
ECM 7	Install VFDs on Constant Volume (CV) Fans	Yes	311,380	53.3	0	$45,809	$99,549	$10,750	$88,799	1.9	313,557
ECM 8	Install VFDs on Water Supply Pump	Yes	21,710	2.1	0	$3,194	$13,806	$2,900	$10,906	3.4	21,862
Domestic Water Heating Upgrade			**26,691**	**0.0**	**0**	**$3,927**	**$229**	**$128**	**$101**	**0.0**	**26,878**
ECM 9	Install Low-Flow DHW Devices	Yes	26,691	0.0	0	$3,927	$229	$128	$101	0.0	26,878
Food Service & Refrigeration Measures			**1,209**	**0.1**	**0**	**$178**	**$230**	**$50**	**$180**	**1.0**	**1,217**
ECM 10	Vending Machine Control	Yes	1,209	0.1	0	$178	$230	$50	$180	1.0	1,217
Custom Measures			**65,866**	**0.0**	**928**	**$13,628**	**$67,025**	**$0**	**$67,025**	**4.9**	**175,026**
ECM 11	Retro-Commissioning Study	Yes	48,075	0.0	807	$10,497	$45,825	$0	$45,825	4.4	142,932
ECM 12	Sub Metering	Yes	17,791	0.0	121	$3,131	$21,200	$0	$21,200	6.8	32,093
TOTALS			**765,928**	**92.0**	**858**	**$116,323**	**$327,731**	**$39,097**	**$288,634**	**2.5**	**871,800**

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

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

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**239,137**	**24.2**	**-55**	**$34,949**	**$69,828**	**$15,039**	**$54,789**	**1.6**	**234,386**
ECM 1	Install LED Fixtures	307	0.0	0	$45	$331	$100	$231	5.1	309
ECM 2	Retrofit Fixtures with LED Lamps	238,830	24.2	-55	$34,903	$69,497	$14,939	$54,558	1.6	234,077
Lighting Control Measures		**65,362**	**6.3**	**-15**	**$9,552**	**$48,033**	**$7,980**	**$40,053**	**4.2**	**64,059**
ECM 3	Install Occupancy Sensor Lighting Controls	60,177	5.8	-14	$8,794	$44,208	$5,655	$38,553	4.4	58,977
ECM 4	Install High/Low Lighting Controls	5,186	0.5	-1	$758	$3,825	$2,325	$1,500	2.0	5,082
Variable Frequency Drive (VFD) Measures		**363,052**	**60.7**	**0**	**$53,411**	**$131,999**	**$15,900**	**$116,099**	**2.2**	**365,590**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	29,962	5.3	0	$4,408	$18,644	$2,250	$16,394	3.7	30,172
ECM 7	Install VFDs on Constant Volume (CV) Fans	311,380	53.3	0	$45,809	$99,549	$10,750	$88,799	1.9	313,557
ECM 8	Install VFDs on Water Supply Pump	21,710	2.1	0	$3,194	$13,806	$2,900	$10,906	3.4	21,862
Domestic Water Heating Upgrade		**26,691**	**0.0**	**0**	**$3,927**	**$229**	**$128**	**$101**	**0.0**	**26,878**
ECM 9	Install Low-Flow DHW Devices	26,691	0.0	0	$3,927	$229	$128	$101	0.0	26,878
Food Service & Refrigeration Measures		**1,209**	**0.1**	**0**	**$178**	**$230**	**$50**	**$180**	**1.0**	**1,217**
ECM 10	Vending Machine Control	1,209	0.1	0	$178	$230	$50	$180	1.0	1,217
Custom Measures		**65,866**	**0.0**	**928**	**$13,628**	**$67,025**	**$0**	**$67,025**	**4.9**	**175,026**
ECM 11	Retro-Commissioning Study	48,075	0.0	807	$10,497	$45,825	$0	$45,825	4.4	142,932
ECM 12	Sub Metering	17,791	0.0	121	$3,131	$21,200	$0	$21,200	6.8	32,093
TOTALS		**761,317**	**91.3**	**858**	**$115,645**	**$317,345**	**$39,097**	**$278,248**	**2.4**	**867,156**

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

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**239,137**	**24.2**	**-55**	**$34,949**	**$69,828**	**$15,039**	**$54,789**	**1.6**	**234,386**
ECM 1	Install LED Fixtures	307	0.0	0	$45	$331	$100	$231	5.1	309
ECM 2	Retrofit Fixtures with LED Lamps	238,830	24.2	-55	$34,903	$69,497	$14,939	$54,558	1.6	234,077

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

ECM 1: Install LED Fixtures

Replace existing fixtures containing metal halide 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: exterior wall pack fixtures.

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent T8 and CFL lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies.

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

Affected building areas: all areas with fluorescent fixtures with T8 tubes and CFL lamps.

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**65,362**	**6.3**	**-15**	**$9,552**	**$48,033**	**$7,980**	**$40,053**	**4.2**	**64,059**
ECM 3	Install Occupancy Sensor Lighting Controls	60,177	5.8	-14	$8,794	$44,208	$5,655	$38,553	4.4	58,977
ECM 4	Install High/Low Lighting Controls	5,186	0.5	-1	$758	$3,825	$2,325	$1,500	2.0	5,082

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

ECM 3: Install Occupancy Sensor Lighting Controls

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

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

A vacancy sensor turns the lights off when the space is not occupied but differs slightly from an occupancy sensor in that it does not automatically turn the lights on when the space is reoccupied. It requires a manual button press by the occupant to engage the lighting systems. Vacancy sensing maximizes the energy savings from the sensor because it's not always necessary to turn lights on when you walk into a room. Vacancy sensors should be used in cases where occupants are less likely to turn the lights on when temporarily entering a space, when adequate day light is available, or when lighting from adjacent spaces or emergency systems is adequate for the task at hand. Application examples for vacancy sensors may include dorm residential spaces and common areas such as conference rooms.

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, classrooms, laboratories, restrooms, conference, and storage rooms.

ECM 4: Install High/Low Lighting Controls

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

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

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

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

Affected building areas: hallways and stairs.

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

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**4,611**	**0.7**	**0**	**$678**	**$10,386**	**$0**	**$10,386**	**15.3**	**4,644**
ECM 5	Premium Efficiency Motors	4,611	0.7	0	$678	$10,386	$0	$10,386	15.3	4,644

ECM 5: Premium Efficiency Motors

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

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Basement Mechanical Space 2	P1,2 - Physics & Maths Areas	2	Heating Hot Water Pump	10.0	Heating Hot Water Pump
Attic Floor	EF-1 - Chemistry Addition	1	Exhaust Fan	15.0	Exhaust Fan
Basement Mechanical Space	AHU-1 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Supply Fan	40.0	Supply Fan
Basement Mechanical Space	AHU-1 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Return Fan	15.0	Return Fan

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

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**363,052**	**60.7**	**0**	**$53,411**	**$131,999**	**$15,900**	**$116,099**	**2.2**	**365,590**
ECM 6	Install VFD on Variable Air Volume (VAV) Fans	29,962	5.3	0	$4,408	$18,644	$2,250	$16,394	3.7	30,172
ECM 7	Install VFDs on Constant Volume (CV) Fans	311,380	53.3	0	$45,809	$99,549	$10,750	$88,799	1.9	313,557
ECM 8	Install VFDs on Water Supply Pump	21,710	2.1	0	$3,194	$13,806	$2,900	$10,906	3.4	21,862

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 VFD on Variable Air Volume (VAV) Fans

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

Affected air handlers: AHU-3 and HV units.

ECM 7: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume exhaust fan motor speeds.

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

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

Affected Exhaust Fan: EF-1, 2, 3, 5; TX-1; PH-EF-6, LEF#1, 2 and 3; EF-202 and 203; and EF-18.

ECM 8: Install VFDs on Water Supply Pump

Install VFDs to control water supply pump(s). Since water supply systems become an open system whenever and end-use valve or fixture is opened the VFD will need to be controlled to maintain sufficient pressure in the distribution system to deliver water to the furthest point in the system.

Energy savings result from reducing the pump speed during low demand periods. Ensure that your control system includes the sensors and inputs required to optimize water flow in your water supply.

4.5 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		**26,691**	**0.0**	**0**	**$3,927**	**$229**	**$128**	**$101**	**0.0**	**26,878**
ECM 9	Install Low-Flow DHW Devices	26,691	0.0	0	$3,927	$229	$128	$101	0.0	26,878

ECM 9: 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

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. Additional cost savings may result from reduced water usage.

4.6 Food Service & 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		**1,209**	**0.1**	**0**	**$178**	**$230**	**$50**	**$180**	**1.0**	**1,217**
ECM 10	Vending Machine Control	1,209	0.1	0	$178	$230	$50	$180	1.0	1,217

ECM 10: Vending Machine Control

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

4.7 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		**65,866**	**0.0**	**928**	**$13,628**	**$67,025**	**$0**	**$67,025**	**4.9**	**175,026**
ECM 11	Retro-Commissioning Study	48,075	0.0	807	$10,497	$45,825	$0	$45,825	4.4	142,932
ECM 12	Sub Metering	17,791	0.0	121	$3,131	$21,200	$0	$21,200	6.8	32,093

ECM 11: 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 be 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.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. It is a screening evaluation for the potential in HVAC Control Improvements. Based on industry standards and previous project experience, the potential energy savings may be up to 15% of existing HVAC energy use. The average cost of retro-commissioning studies and control improvements is $0.30 per square foot. Actual savings and costs will need to be outlined by the specific contractor engaged to perform the study. For the purposes of this report, we have conservatively estimated savings to be 2% of the total HVAC energy consumption baseline.

ECM 12: Sub Metering

Facility staff expressed interest in utility sub metering key buildings which are currently served by a master meter and the central plant. Utility submeters alone do not save energy, but they are a useful tool under the right circumstances. Utility sub-meters can provide facility staff with real-time energy use data for specific buildings, information that enhances the potential for greater energy management activities. Revenue grade submeters are a tool that allow owners to bill tenants or departments for the energy consumed in the spaces they occupy. Better resolution on building system performance can lead to occupant behavioral changes which often result in reduced energy use.

A high-level evaluation of potential savings and costs is provided for demonstration purposes only. Based on industry standards and case studies, the potential energy savings may be up to 5% of existing energy usage. For the purposes of this report, a conservative assumed savings of 1% was applied to CPM building allocated electrical and natural gas consumption of the sub metered buildings based on the premise of occupant behavioral changes. For the main facility, the following submeters are proposed: smart electric meter, steam flow meter, and chilled water flow meter. Meter costs for the evaluation are based on average building use across the campus: smart electric meter $2,400, steam flow meter $6,700, chilled water flow meter $9,700. The actual scope of work and implementation costs must be provided by a contractor in the future. This measure is recommended for implementation based on the initial energy and economic results but primarily for enhancing the potential for greater energy management activities.

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 between 5 to 20 percent 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, planned capital upgrades, and 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 will 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 can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[5] . Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Lighting Maintenance

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

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

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

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 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.

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.

Steam Trap Repair and Replacement

Steam traps are a crucial part of delivering heat from the boiler to the space heating units. Steam traps are automatic valves that remove condensate from the system. If the traps fail closed, condensate can build up in the steam supply side of the trap which reduces the flow in the steam lines and thermal capacity of the radiators. Or they may fail open, allowing steam into the condensate return lines resulting in wasted energy, water, and hammering. Losses can be significantly reduced by testing and replacing equipment as they start to fail. Repair or replace traps that are blocked or allowing steam to pass. Inspect steam traps as part of a regular steam system maintenance plan.

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.

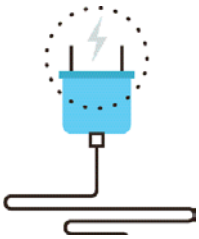
Compressed Air System Maintenance

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

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

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[6]. Your local utility may offer incentives or rebates for this equipment.

[6] 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.

Water Conservation

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

For more information regarding water conservation go to the EPA's WaterSense® website[7] or download a copy of EPA's "WaterSense® at Work: Best Management Practices for Commercial and Institutional Facilities"[8] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

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

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

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

Procurement Strategies

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

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

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

6 On-site Generation

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

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

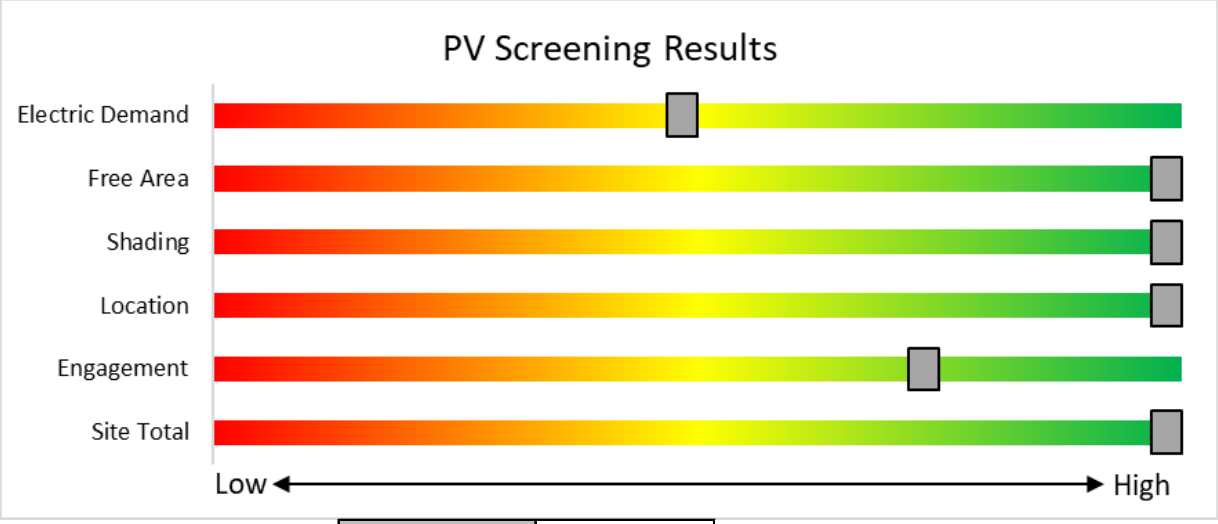
6.1 Solar Photovoltaic

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

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has 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	161	kW DC STC
Electric Generation	191,811	kWh/yr
Displaced Cost	$28,220	/yr
Installed Cost	$418,600	

Figure 9 - Photovoltaic Screening

Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installation.

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:

Transition Incentive (TI) Program: https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-program

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

6.2 Combined Heat and Power

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

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

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

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

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. 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.

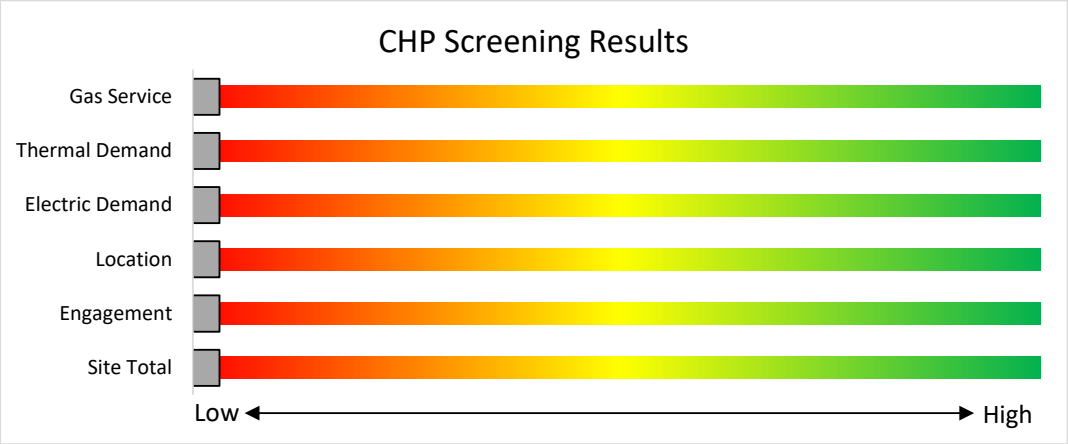


Figure 10 - Combined Heat and Power Screening

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

7 PROJECT FUNDING AND INCENTIVES

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

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Incentives are paid out in three installments. The first installment is meant to help offset the costs of the initial engineering study. The subsequent incentives are paid based on the level of energy savings up to 50% of the total project cost. See Section 7.3 for all incentive details.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.
Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.			

7.1 SmartStart

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

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

Equipment with Prescriptive Incentives Currently Available:

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

Incentives

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

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

How to Participate

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

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

7.2 Direct Install

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

Based on the site building and utility data provided, the facility does not meet the requirements of the current DI program.

Incentives

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

How to Participate

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

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

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15 percent source energy savings, and lighting cannot make up the majority of the savings.

P4P is a generally a good option for medium-to-large sized facilities looking to implement as many measures as possible under a single project to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

For master metered campuses, such as The College of New Jersey, P4P eligibility is evaluated at the campus level. For the purposes of reporting P4P eligibility is being presented at all of the buildings. Final eligibility will be assessed once all of the reports are completed and will be addressed at the Exit Meeting. If the campus does not meet the 15% savings threshold based on measures identified during the LGEA Program process it is possible that additional measures could be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process.

Incentives

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

How to Participate

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

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

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

7.4 Combined Heat and Power

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

Incentives

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

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

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

How to Participate

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

7.5 Energy Savings Improvement Program

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

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

How to Participate

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

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

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

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

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

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program 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.

7.6 Transition Incentive (TI) Program

The TI program is a bridge between the Legacy SREC Program and a to-be determined Successor Incentive Program. The program is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn TRECs (Transition Incentive Renewable Energy Certificates). The Transition Incentive is structured as a factorized renewable energy certificate. The factors allow the TI Program to provide differentiated financial incentives for different types of solar installations. NJBPU calculates the value of a Transition Renewable Energy Certificate (TREC) by multiplying the base compensation rate ($152/MWh) by the project's assigned factor (i.e. $152 x 0.85 = $129.20/MWh). The TREC factors are defined based on the chart below:

Project Type	Factor
Subsection (t): landfill, brownfield, areas of historic fill	1.00
Grid supply (Subsection (r)) rooftop	1.00
Net metered non-residential rooftop and carport	1.00
Community solar	0.85
Grid supply (Subsection (r)) ground mount	0.60
Net metered residential ground mount	0.60
Net metered residential rooftop and carport	0.60
Net metered non-residential ground mount	0.60

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number, which enables it to generate New Jersey TRECs.

Eligible projects may generate TRECs for 15 years following the commencement of commercial operations (also referred to as the "Transition Incentive Qualification Life"). After 15 years, projects may be eligible for a NJ Class I REC.

TRECs will be used by the identified compliance entities to satisfy a compliance obligation tied to a new Transition Incentive Renewable Portfolio Standard ("TI-RPS"), which will exist in parallel with, and completely separate from, the existing Solar RPS for Legacy SRECs. The TI-RPS is a carve-out of the current Class I RPS requirement. The creation of TRECs is based upon metered generation supplied to PJM-EIS General Attribute Tracking System ("GATS") by the owners of eligible facilities or their agents. GATS would create one TREC for each MWh of energy produced from a qualified facility.

TRECs will be purchased monthly by a TREC Administrator who will allocate the TRECs 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.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan. The Transition Incentive Program online portal is now open to new applications effective May 1, 2020. There are instructions on "How and When to Transfer my SRP Registration to the Transition Incentive Program". If you are considering installing solar photovoltaics on your building, visit the following link for more information:

https://www.njcleanenergy.com/renewable-energy/programs/transition-incentive-program

8 PROJECT DEVELOPMENT

Energy conservation measures (ECMs) have been identified for your site and their energy and economic analyses are provided within this LGEA report. 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 includes the review of multiple bids for project work, incorporate potential operational & maintenance (O&M) cost savings and maximize your incentive potential.

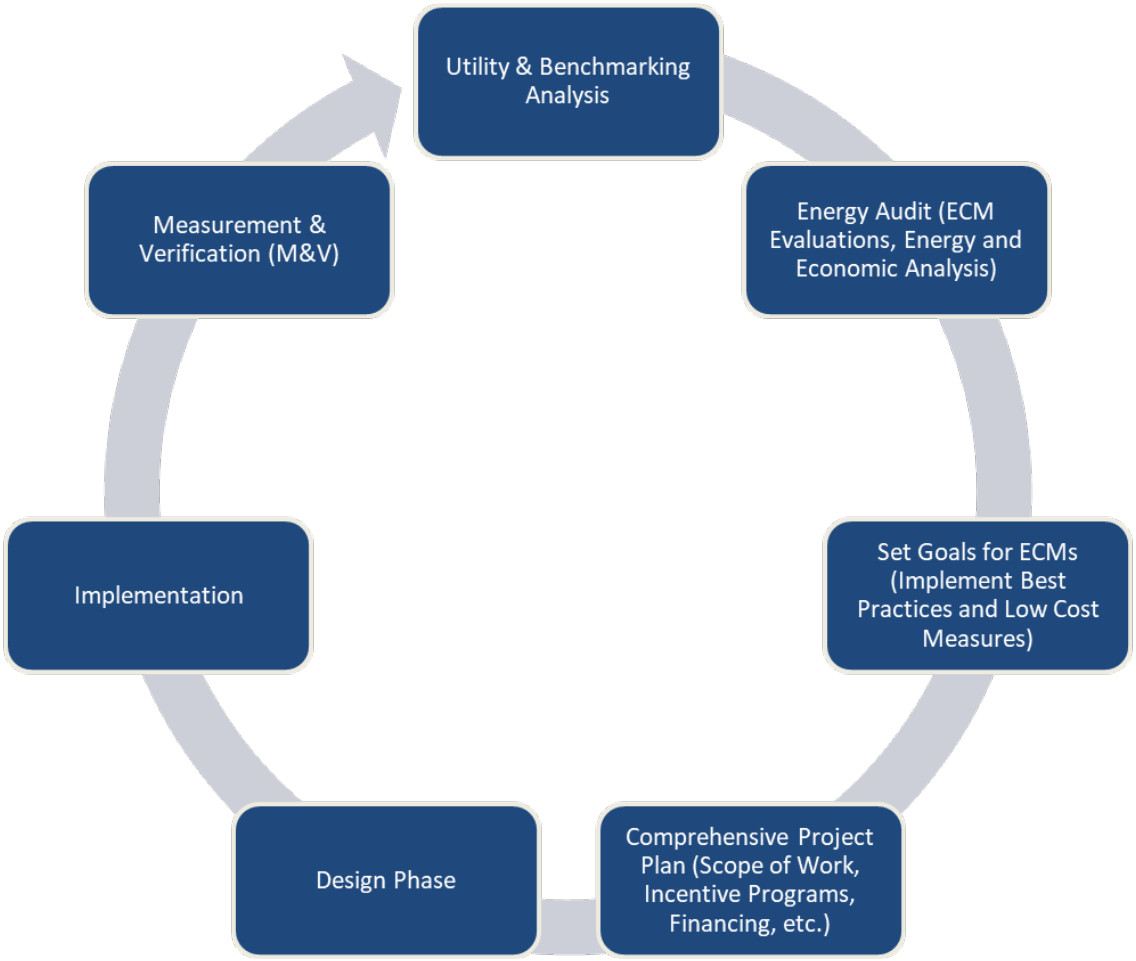


Figure 11 – Project Development Cycle

9 Energy Purchasing and Procurement Strategies

9.1 Retail Electric Supply Options

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

A list of licensed third-party natural gas suppliers is available at the NJBPU website[10].

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

[10] 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
3rd Floor Storage Room	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,150	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,484	0.2	903	0	$132	$635	$100	4.1
Attic	4	Compact Fluorescent: (1) 14W A19 Screw-In Lamp	Wall Switch	S	14	5,376	2	Relamp	No	4	LED Lamps: A19 Lamps	Wall Switch	10	5,376	0.0	90	0	$13	$69	$4	4.9
Attic 2	3	Compact Fluorescent: (1) 14W A19 Screw-In Lamp	Wall Switch	S	14	5,376	2	Relamp	No	3	LED Lamps: A19 Lamps	Wall Switch	10	5,376	0.0	68	0	$10	$52	$3	4.9
Basement Chemistry Addition	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
Basement Chemistry Addition	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,709	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	1,224	0	$179	$365	$100	1.5
Basement Chemistry	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
Basement Chemistry	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	226	0	$33	$37	$10	0.8
Basement Chemistry	9	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.2	1,898	0	$277	$922	$125	2.9
Basement Mechanical Space	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,301	2	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,301	0.2	1,561	0	$228	$402	$110	1.3
Basement Mechanical Space 2	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
Basement Mechanical Space 2	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	S	29	4,301		None	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,301	0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,301	2	Relamp	No	24	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,301	0.4	3,406	-1	$498	$876	$240	1.3
Basement Storage	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
Basement Storage	13	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,150	2, 3	Relamp	Yes	13	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,484	0.3	1,174	0	$172	$745	$130	3.6
Building Service 1st Floor	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
C - 209 Conference Room	3	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	3	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
C - 209 Conference Room	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
C-116 Receiving Area	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	903	0	$132	$416	$75	2.6
Classroom 131 Teaching Lab	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 131 Teaching Lab	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Classroom 131 Teaching Lab	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,709	2	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	3,672	-1	$537	$1,095	$300	1.5
Classroom 132 Prep Room	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Classroom 132 Prep Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,709	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	734	0	$107	$219	$60	1.5
Classroom 132 Teaching Lab	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 132 Teaching Lab	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	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
Classroom 132 Teaching Lab	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,709	2	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	3,672	-1	$537	$1,095	$300	1.5
Classroom C-113	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,612	-1	$528	$1,124	$230	1.7
Classroom C-114 Chemistry Lab	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Classroom C-114A Prep Room	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,129	0	$165	$453	$85	2.2
Classroom C-115 Chemistry Lab	27	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	27	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.6	6,095	-1	$891	$1,526	$340	1.3
Classroom C-121 Chemistry	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
Classroom C-121 Chemistry	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	5,418	-1	$792	$1,416	$310	1.4
Classroom C-122 Chemistry	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Classroom C-122 Chemistry Computer Lab	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Classroom C-131 Teaching Lab	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 C-131 Teaching Lab	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Classroom C-131 Teaching Lab	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	3,709	2	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	3,672	-1	$537	$1,095	$300	1.5
Classroom C-213 Chemistry Lab	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	2,257	-1	$330	$635	$135	1.5
Classroom C-213A Prep Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,580	0	$231	$526	$105	1.8
Classroom C-218 Research Lab	32	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	32	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.7	7,224	-2	$1,056	$1,978	$425	1.5
Classroom C-220 Research Lab	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.4	4,289	-1	$627	$1,234	$260	1.6
Classroom C-312 Research Lab	17	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	17	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.4	3,838	-1	$561	$1,161	$240	1.6
Classroom C-312A	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
Classroom C-312A	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Classroom C-312A	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Classroom P- 302 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 303 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 304 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 305 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 306 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Classroom P- 307 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 308 Research Lab	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Classroom P- 309 Physics Lab	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,129	0	$165	$453	$85	2.2
Classroom P- 310 General Physics Lab	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	903	0	$132	$416	$75	2.6
Classroom P- 311 Prep Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Classroom P- 312 Physics Lab	48	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	48	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	1.0	10,835	-2	$1,584	$2,833	$620	1.4
Classroom P-101	8	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	5,376	2, 3	Relamp	Yes	8	LED Lamps: LED Plug-In Lamp	Occupancy Sensor	36	3,709	0.1	1,156	0	$169	$674	$67	3.6
Classroom P-101	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 P-101	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.1	591	0	$86	$91	$25	0.8
Classroom P-101	49	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	49	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	1.0	10,334	-2	$1,510	$4,631	$630	2.6
Classroom P-117	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 P-117	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.7	7,675	-2	$1,122	$2,052	$445	1.4
Classroom P-201 Computer Lab	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Classroom P-218 Math Ed Lab	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 P-218 Math Ed Lab	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Classroom P-219	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 P-219	34	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	34	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.7	7,675	-2	$1,122	$2,052	$445	1.4
Classroom P-228	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Classroom P-230	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	5,418	-1	$792	$1,416	$310	1.4
Classroom P-230	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	5,418	-1	$792	$1,416	$310	1.4
Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	730	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	504	0.0	61	0	$9	$189	$40	16.6
Corridor Vending Machine Area	4	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	5,376	2, 4	Relamp	Yes	4	LED Lamps: LED Plug-In Lamp	High/Low Control	36	3,709	0.1	578	0	$84	$427	$156	3.2
Corridor Vending Machine Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	355	0	$52	$73	$20	1.0
Electrical Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.1	245	0	$36	$416	$75	9.5
Electrical Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.1	245	0	$36	$416	$75	9.5

	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
Electrical Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Electrical Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.2	490	0	$72	$562	$115	6.2
Elevator Lobby 1st Floor	1	LED - Fixtures: 40W LED Fixture	Occupancy Sensor	S	40	3,709		None	No	1	LED - Fixtures: 40W LED Fixture	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Elevator Lobby 1st Floor	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Elevator Lobby 2nd Floor	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
Elevator Lobby 2nd Floor	4	LED - Fixtures: 40W LED Fixtures	Wall Switch	S	40	5,376	4	None	Yes	4	LED - Fixtures: 40W LED Fixtures	High/Low Control	40	3,709	0.0	267	0	$39	$225	$0	5.8
Elevator Lobby 2nd Floor	2	LED - Fixtures: 15W Downlight Recessed	Wall Switch	S	15	5,376	4	None	Yes	2	LED - Fixtures: 15W Downlight Recessed	High/Low Control	15	3,709	0.0	50	0	$7	$0	$0	0.0
Elevator Lobby 2nd Floor	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	3,709	0.0	211	0	$31	$72	$10	2.0
Elevator Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,882	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,882	0.0	124	0	$18	$73	$20	2.9
Entrance Exit 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	5,376	0.0	376	0	$55	$73	$20	1.0
Entrance Exit 5	1	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	40	3,709		None	No	1	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Entrance Exit 5	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Entrance Teaching Lab	4	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	4	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Exterior Walkway	36	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock		30	4,380		None	No	36	LED - Fixtures: Outdoor Pole/Arm-Mounted Area/Roadway Fixture	Timeclock	30	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		21	4,380		None	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	21	4,380	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack	6	Compact Fluorescent: 42W Screw in Lamp	Timeclock		42	4,380	2	Relamp	No	6	LED Lamps: LED Lamps	Timeclock	29	4,380	0.0	331	0	$49	$103	$6	2.0
Exterior Wall Pack Exit 1	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock		45	4,380		None	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	45	4,380	0.0	0	0	$0	$0	$0	0.0
Hallway 1st Floor Chemistry	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
Hallway 1st Floor Chemistry	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Hallway 1st Floor North Physics	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
Hallway 1st Floor North Physics	15	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	15	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	3,709	0.3	3,164	-1	$462	$1,537	$600	2.0
Hallway 1st Floor South Physics	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
Hallway 1st Floor South Physics	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Hallway 1st Floor West Physics	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
Hallway 1st Floor West Physics	7	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	3,709	0.1	1,476	0	$216	$732	$295	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
Hallway 2nd Floor North Physics	2	Compact Fluorescent: (1) 13W Plug-In Lamp	Wall Switch	S	13	5,376	2	Relamp	No	2	LED Lamps: LED Plug-In Lamp	Wall Switch	9	5,376	0.0	42	0	$6	$25	$2	3.8
Hallway 2nd Floor North Physics	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
Hallway 2nd Floor North Physics	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Hallway 2nd Floor South Physics	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
Hallway 2nd Floor South Physics	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Hallway 2nd Floor West Physics	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
Hallway 2nd Floor West Physics	7	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	7	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	3,709	0.1	1,476	0	$216	$732	$295	2.0
Hallway South 2nd Floor Chemistry	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
Hallway South 2nd Floor Chemistry	4	LED - Fixtures: 15W Downlight Recessed	Wall Switch	S	15	5,376	4	None	Yes	4	LED - Fixtures: 15W Downlight Recessed	High/Low Control	15	3,709	0.0	100	0	$15	$225	$140	5.8
Hallway South 2nd Floor Chemistry	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	3,709	0.1	633	0	$92	$442	$135	3.3
Hallway South 3rd Floor	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
Hallway South 3rd Floor	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Hallway South 3rd Floor Chemistry	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
Hallway South 3rd Floor Chemistry	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	312	0	$46	$145	$20	2.7
Hallway west 3rd Floor	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
Hallway west 3rd Floor	4	LED - Fixtures: 40W LED Fixtures	Wall Switch	S	40	5,376	4	None	Yes	4	LED - Fixtures: 40W LED Fixtures	High/Low Control	40	3,709	0.0	267	0	$39	$225	$140	2.2
Hallway west 3rd Floor	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Handicap Ramp 2nd Floor	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
Handicap Ramp 2nd Floor	1	LED - Fixtures: 34W LED Fixture	Occupancy Sensor	S	34	3,709		None	No	1	LED - Fixtures: 34W LED Fixture	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Janitorial	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,095	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,095	0.0	36	0	$5	$37	$10	5.0
Lobby	2	LED - Fixtures: 40W LED Fixtures	Wall Switch	S	40	5,376	4	None	Yes	2	LED - Fixtures: 40W LED Fixtures	High/Low Control	40	3,709	0.0	133	0	$19	$0	$0	0.0
Lobby	12	LED - Fixtures: 21W LED Fixtures	Wall Switch	S	21	5,376	4	None	Yes	12	LED - Fixtures: 21W LED Fixtures	High/Low Control	21	3,709	0.0	420	0	$61	$450	$0	7.3
Main Lobby Physics	2	Compact Fluorescent: (2) 26W Plug-In Lamps	Wall Switch	S	52	5,376	2	Relamp	No	2	LED Lamps: G25 Lamps	Wall Switch	36	5,376	0.0	168	0	$25	$101	$8	3.8
Main Lobby Physics	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
Mechanical Room 3rd Floor	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	10	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.2	482	0	$70	$365	$100	3.8

	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
Mechanical Room Basement	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.1	385	0	$56	$292	$80	3.8
Main Lobby Chemistry	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
Main Lobby Chemistry	8	LED - Fixtures: 15W Downlight Recessed	Wall Switch	S	15	5,376	4	None	Yes	8	LED - Fixtures: 15W Downlight Recessed	High/Low Control	15	3,709	0.0	200	0	$29	$450	$0	15.4
Physics Shop	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	1,806	0	$264	$562	$115	1.7
Restroom - Female 1st Floor Chemistry	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$73	$20	0.8
Restroom - Female 1st Floor Chemistry	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Female 2nd Floor Chemistry	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$73	$20	0.8
Restroom - Female 2nd Floor Chemistry	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Female 3rd Floor Chemistry	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$73	$20	0.8
Restroom - Female 3rd Floor Chemistry	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Male 1st Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8
Restroom - Male 1st Floor	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Male 2nd Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8
Restroom - Male 2nd Floor	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Male 3rd Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8
Restroom - Male 3rd Floor	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Restroom - Male 1st Floor Chemistry	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	226	0	$33	$37	$10	0.8
Restroom - Male 1st Floor Chemistry	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Restroom - Male 2nd Floor Chemistry	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	226	0	$33	$37	$10	0.8
Restroom - Male 2nd Floor Chemistry	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Restroom - Male 2nd Floor Chemistry	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	226	0	$33	$37	$10	0.8
Restroom - Male 2nd Floor Chemistry	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Restroom - Women 1st Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8
Restroom - Women 1st Floor	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Restroom - Women 2nd Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8

	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
Restroom - Women 2nd Floor	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Restroom - Women 3rd Floor	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	3,709	0.0	236	0	$35	$37	$10	0.8
Restroom - Women 3rd Floor	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Room 0-E2	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,957	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,040	0.0	248	0	$36	$189	$40	4.1
Room 001 Electric Room	2	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 001 Electric Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.1	289	0	$42	$219	$60	3.8
Room 002 Pump Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	4,032	2	Relamp	No	30	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,032	0.5	3,992	-1	$583	$1,095	$300	1.4
Room 1-T1	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	3,494	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,411	0.1	734	0	$107	$453	$85	3.4
Room 120 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Room 120D Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.0	123	0	$18	$189	$20	9.4
Room 120E Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.0	123	0	$18	$189	$20	9.4
Room 123	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room 130 Mechanical	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,460	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,460	0.0	48	0	$7	$37	$10	3.8
Room 215 - Study	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room 216 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room 217 - Office	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Room 234 Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room 235 Copy Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,354	0	$198	$489	$95	2.0
Room 317A- Study	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.2	1,687	0	$247	$850	$115	3.0
Room-319B Research Lab	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C- 216A	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
Room C- 216A	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C- 217A	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
Room C- 217A	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	4	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	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
Room C- 218A	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	2,032	0	$297	$599	$125	1.6
Room C- 221	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C- 222 Research Lab	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room C- 302	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	5	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-004 Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	2,709	-1	$396	$708	$155	1.4
Room C-100 - Office	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.0	422	0	$62	$261	$40	3.6
Room C-100C	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
Room C-100C	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-100D	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
Room C-100D	9	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	9	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-100D	2	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	2	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-100D	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	2	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-101- Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Room C-102 - Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Room C-103 - Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Room C-104- Office	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	633	0	$92	$487	$65	4.6
Room C-105 Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room C-106 Communication Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room C-107 Electric Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,957	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,957	0.0	98	0	$14	$37	$10	1.9
Room C-108 Department of Chemistry	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
Room C-108 Department of Chemistry	14	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.3	2,953	-1	$431	$1,284	$175	2.6
Room C-109 Copy Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Room C-112 Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room C-200A Office	4	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	4	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,034	0	$151	$432	$47	2.5
Room C-201 Office	4	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	4	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,034	0	$151	$432	$47	2.5

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Room C-202 Office	4	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	4	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,034	0	$151	$432	$47	2.5
Room C-203 Office	4	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	4	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,034	0	$151	$432	$47	2.5
Room C-204 Office	5	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	5	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,292	0	$189	$473	$50	2.2
Room C-205 Office	5	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	5	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,292	0	$189	$473	$50	2.2
Room C-206 Office	5	Compact Fluorescent: (3) 31W Double Biaxial Plug-In Lamps	Wall Switch	S	93	5,376	2, 3	Relamp	Yes	5	LED Lamps: PL-L (Biax) Lamps	Occupancy Sensor	65	3,709	0.1	1,292	0	$189	$473	$50	2.2
Room C-207 Communication Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room C-208 Electrical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.0	48	0	$7	$37	$10	3.8
Room C-210 Research Lab	9	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	9	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-211 Study	4	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	4	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-212 Office	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-214 Tutorial	6	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	6	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-214A Office	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-214B Office	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-214C Office	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room C-215/Research Lab	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,612	-1	$528	$1,124	$230	1.7
Room C-217 Research Lab	31	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	31	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.7	6,998	-2	$1,023	$1,942	$415	1.5
Room C-220C	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,129	0	$165	$453	$85	2.2
Room C-300B	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	2,257	-1	$330	$635	$135	1.5
Room C-301 Lab	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	2,257	-1	$330	$635	$135	1.5
Room C-303 Research Lab	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.6	6,321	-1	$924	$1,562	$350	1.3
Room C-304	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Room C-307 Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.0	96	0	$14	$73	$20	3.8
Room C-307A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room C-307B	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Room C-307C	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0

	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
Room C-308 X-Ray Lab	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	1,806	0	$264	$562	$115	1.7
Room C-309 RADIATION LAB	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.2	1,806	0	$264	$562	$115	1.7
Room C-309 X-Ray Lab	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,354	0	$198	$489	$95	2.0
Room C-310	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room C-311 Mechanical Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.1	434	0	$63	$329	$90	3.8
Room C-313 Research Lab	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.6	6,321	-1	$924	$1,562	$350	1.3
Room C-314 Research Lab	18	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	18	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.4	4,063	-1	$594	$1,197	$250	1.6
Room C-314 Research Lab	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.0	422	0	$62	$261	$40	3.6
Room C-314A	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
Room C-314A	9	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	9	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room O.E1 Electrical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.0	48	0	$7	$37	$10	3.8
Room P - 311B	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 203 - Office	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Room P- 204 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 205 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 206- Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 207- Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 208- Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 209- Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 210 - Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 211 - Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 212 - Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 213 - Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 214 - Office	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P- 226 Building Attendant	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.0	422	0	$62	$261	$40	3.6

	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
Room P- 232 - Office	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Room P- 233 - Office	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	1,265	0	$185	$705	$95	3.3
Room P- 234 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 245 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 246 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 247- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P- 314 Building Attendant	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.0	422	0	$62	$261	$40	3.6
Room P- 317 Classroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Room P- 318 Physics Lab	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	903	0	$132	$416	$75	2.6
Room P- 318A Physics Lab	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Room P- 318B Physics Lab	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Room P- 322 Building Service	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.0	422	0	$62	$261	$40	3.6
Room P-106 - Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,354	0	$198	$489	$95	2.0
Room P-107- Office	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.2	1,687	0	$247	$850	$115	3.0
Room P-108- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-108A- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-109- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-109A - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-110 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-111- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-112- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-113- Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-114- Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,354	0	$198	$489	$95	2.0
Room P-115 Planetarium	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	903	0	$132	$416	$75	2.6
Room P-115B - Office	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	1,354	0	$198	$489	$95	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
Room P-115D Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,882	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,882	0.0	62	0	$9	$37	$10	2.9
Room P-115C	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room P-121 Physics Lab Astronomy	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Room P-122 Physics Lab Geology	25	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	25	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.5	5,643	-1	$825	$1,453	$320	1.4
Room P-122A	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room P-130 Electrical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.0	48	0	$7	$37	$10	3.8
Room P-130	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room P-132 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-133 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-134 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-135 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-136 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-137 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-202 - Tutorial	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
Room P-202 - Tutorial	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-202A - Office	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-202B - Office	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-220 Student Commons	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
Room P-220 Student Commons	16	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	16	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-221 - Tutorial	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	4	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-221 - Tutorial	8	LED - Fixtures: 21W LED Fixtures	Occupancy Sensor	S	21	3,709		None	No	8	LED - Fixtures: 21W LED Fixtures	Occupancy Sensor	21	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-222 Study	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-223 - Research	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-223 - Research	6	LED - Fixtures: 21W LED Fixtures	Occupancy Sensor	S	21	3,709		None	No	6	LED - Fixtures: 21W LED Fixtures	Occupancy Sensor	21	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-224 Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.1	245	0	$36	$416	$40	10.5

	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
Room P-231 - Deptm Mathematics & Statistics	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
Room P-231 - Deptm Mathematics & Statistics	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	5,376	0.0	156	0	$23	$72	$10	2.7
Room P-237 Communication Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room P-238 Building Service	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Room P-239 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-240 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-241 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-242 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-243 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-244 - Office	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P-301 Project Lab	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
Room P-301 Project Lab	1	LED - Fixtures: 40W LED Fixture	Occupancy Sensor	S	40	3,709		None	No	1	LED - Fixtures: 40W LED Fixture	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-309A - Experimental Lab	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-319A Research Lab	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	10	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Room P-320 Electrical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,460	0.0	48	0	$7	$37	$10	3.8
Room P-321 Communication Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.1	677	0	$99	$380	$65	3.2
Room P-403A	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
Room P-403A	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P104 Conf room	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Room P105 - Dean Office	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.3	3,160	-1	$462	$781	$175	1.3
Room P124	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	3,709	0.1	844	0	$123	$560	$75	3.9
Room P126 Conf Room	8	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	4,032	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,782	0.2	1,265	0	$185	$850	$115	4.0
Room P127 Copy Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,709	0.0	451	0	$66	$189	$40	2.3
Room003 Generator Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room003 Generator Room	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,150	2	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,150	0.1	497	0	$73	$256	$70	2.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Stairs Center	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
Stairs Center	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	3,709	0.2	1,806	0	$264	$517	$305	0.8
Stairs S2	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
Stairs S2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,376	0.0	177	0	$26	$37	$10	1.0
Stairs Basement Addition	7	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	7	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Stairs Exit	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
Stairs Exit	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	3,709	0.2	2,032	0	$297	$554	$315	0.8
Stairs Exit 2	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs Exit 2	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	3,709	0.2	2,032	0	$297	$554	$315	0.8
Stairs Exit B1	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
Stairs Exit B1	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	5,376	2, 4	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	3,709	0.2	2,032	0	$297	$554	$315	0.8
Storage	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	1,460		None	No	3	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	1,460	0.0	0	0	$0	$0	$0	0.0
Storage C-117	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,460	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,007	0.0	123	0	$18	$189	$20	9.4
Study Area	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Study Area C-100A	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	S	40	3,709		None	No	2	LED - Fixtures: 40W LED Fixtures	Occupancy Sensor	40	3,709	0.0	0	0	$0	$0	$0	0.0
Study Area C-100A	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	S	15	3,709		None	No	6	LED - Fixtures: 15W Downlight Recessed	Occupancy Sensor	15	3,709	0.0	0	0	$0	$0	$0	0.0
Study Area Hallway	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Study Area Hallway	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	S	34	3,709		None	No	8	LED - Fixtures: 34W LED Fixtures	Occupancy Sensor	34	3,709	0.0	0	0	$0	$0	$0	0.0
Exterior Wall Pack - Exit 2	2	Metal Halide: Outdoor Wall-Mounted Area Fixture	Timeclock		50	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Timeclock	15	4,380	0.0	307	0	$45	$331	$100	5.1

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
Entrance Teaching Lab	CUH-201	1	Fan Coil Unit	0.2	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Medical Compressed Air System	2	Air Compressor	15.0	91.0%	No			W	3,723		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Honeywell Air Compressor	2	Air Compressor	2.0	82.5%	No			W	1,752		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	CHP1,2 - Physics & Maths Areas	2	Chilled Water Pump	50.0	93.0%	Yes			W	3,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	CWP-201,202 - Chemistry Addition	2	Chilled Water Pump	15.0	93.0%	Yes			W	3,000		No	93.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	P1,2 - Physics & Maths Areas	2	Heating Hot Water Pump	10.0	89.5%	Yes			W	3,391	5	Yes	91.7%	No		0.2	1,017	0	$150	$2,687	$0	18.0
Room 002 Pump Room	HWP-201,202 - Chemistry & Chemistry Addition	2	Heating Hot Water Pump	10.0	91.7%	Yes			W	3,391		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
3rd Floor Storage Room	EF-2 (Exhaust Blower)	1	Exhaust Fan	2.0	84.0%	No	Penn Barry	200 VCR-AF	W	5,564	7	No	86.5%	Yes	1	0.6	3,769	0	$554	$3,261	$100	5.7
3rd Floor Storage Room	EF-5 (Exhaust Blower)	1	Exhaust Fan	1.5	82.5%	No	Penn Barry	135 VCP BI	W	5,564	7	No	86.5%	Yes	1	0.5	2,918	0	$429	$3,391	$75	7.7
3rd Floor Storage Room	EF-3 (Exhaust Blower)	1	Exhaust Fan	2.0	84.0%	No	Penn Barry	165 VCR BI	W	5,564	7	No	86.5%	Yes	1	0.6	3,769	0	$554	$3,261	$100	5.7
Attic Floor	EF-1 - Chemistry Addition	1	Exhaust Fan	15.0	91.0%	Yes	Penn Barry	100 ESI CW	W	5,564	5	Yes	93.0%	No		0.1	1,104	0	$162	$1,847	$0	11.4
Attic Floor	TX-1	1	Exhaust Fan	2.0	84.0%	No			W	5,564	7	No	86.5%	Yes	1	0.6	3,769	0	$554	$3,261	$100	5.7
Basement Mechanical Space 1	Basement Mechanical Space 1	1	Exhaust Fan	1.5	82.5%	No			W	5,564	7	No	86.5%	Yes	1	0.5	2,918	0	$429	$3,391	$75	7.7
Basement Mechanical Space 2	Basement Mechanical Space 2 - PH-EF6	1	Exhaust Fan	5.0	86.5%	No			W	5,564	7	No	89.5%	Yes	1	1.6	9,483	0	$1,395	$4,076	$900	2.3
Basement - Chemistry	Basement - Chemistry	1	Exhaust Fan	2.0	84.0%	No			W	5,564	7	No	86.5%	Yes	1	0.6	3,769	0	$554	$3,261	$100	5.7
Roof	LEF #1,#2,#3 - Chemistry Lab Fume Hoods	3	Exhaust Fan	50.0	91.0%	No	Fume Hood		W	5,564	7	No	94.1%	Yes	3	46.6	271,785	0	$39,984	$62,921	$9,000	1.3
Room 002 Pump Room	EF-203 Room 002 Pump Room	1	Exhaust Fan	0.3	65.0%	No			W	5,564		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	EF-202 Room 002 Pump Room	1	Exhaust Fan	1.5	82.5%	No			W	5,564	7	No	86.5%	Yes	1	0.5	2,918	0	$429	$3,391	$75	7.7
Room 001 Electric Room	Room 001 Electric Room	1	Exhaust Fan	1.0	81.0%	No			W	5,564	7	No	85.5%	Yes	1	0.3	1,970	0	$290	$3,010	$75	10.1
Room C-311 - Mechanical Room	EF-18 Room C-311 - Mechanical Room	1	Exhaust Fan	1.5	82.5%	No			W	5,564	7	No	86.5%	Yes	1	0.5	2,918	0	$429	$3,391	$75	7.7

		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
Room 001 Electric Room	FCU-201 - Room 001 Electric Room - Chemistry Addition	1	Fan Coil Unit	1.5	82.5%	No			W	2,745	6	No	82.5%	Yes	1	0.4	1,396	0	$205	$2,936	$75	13.9
Basement Mechanical Space 1	Sewage Water (P1P2)	2	Other	0.8	70.0%	No			W	1,095		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Sewage Water - ERBBP-8	2	Other	0.8	70.0%	No			W	1,095		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Sewage Water - ERBBP-5	2	Other	0.8	70.0%	No			W	1,095		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Sewage Water - ERBBP-7	2	Other	0.8	70.0%	No			W	1,095		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Elevator Room	Elevator Pump - Chemistry & Addition	1	Other	75.0	85.5%	No			W	1,095		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement - Chemistry	Chemical Pump	1	Process Pump	2.0	84.0%	No			W	2,745		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	Sewage Pumps	8	Other	0.8	70.0%	No			W	1,095		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	Chemical Pump	1	Process Pump	0.5	70.0%	No			W	2,745		No	70.0%	No		0.0	0	0	$0	$0	$0	0.0
Room P-115D Elevator Room	Elevator Pump - Physics/Mathematics	1	Other	40.0	89.5%	No			W	1,095		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Medical Vacuum Pumps	2	Air Compressor	7.5	89.5%	No			W	2,016		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Water Filtration Pumps	2	Process Pump	3.0	86.5%	No			W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
3rd Floor Mechnical Room	AHU-2 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Supply Fan	75.0	94.2%	Yes			W	5,564		No	94.2%	No		0.0	0	0	$0	$0	$0	0.0
3rd Floor Mechnical Room	AHU-2 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Return Fan	20.0	91.7%	Yes			W	5,564		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space	AHU-1 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Supply Fan	40.0	93.0%	Yes			B	5,564	5	Yes	94.1%	No		0.2	1,461	0	$215	$4,006	$0	18.6
Basement Mechanical Space	AHU-1 - PH-2 (Physics/Maths) 1st, 2nd, 3rd Floor (Offices & Common Areas)	1	Return Fan	15.0	91.0%	Yes			W	5,564	5	Yes	93.0%	No		0.1	1,030	0	$152	$1,847	$0	12.2
3rd Floor Mechnical Room	AHU-3 - Planetarium (Rmm 115)	1	Supply Fan	3.0	89.5%	No			W	5,564	6	No	89.5%	Yes	1	0.9	4,870	0	$716	$3,884	$200	5.1
3rd Floor Mechnical Room	AHU-3 - Planetarium (Rmm 115)	1	Return Fan	1.0	82.5%	No			W	5,564	6	No	85.5%	Yes	1	0.3	1,872	0	$275	$3,010	$75	10.7
Basement Mechanical Space 2	HV-1 - Basement Mechanical Room - Physics/Maths	1	Supply Fan	7.5	88.5%	No			W	5,564	6	No	91.0%	Yes	1	2.2	12,920	0	$1,901	$4,738	$1,000	2.0
Basement Mechanical Space	HV-2 - Basement Mechanical Room - Chemistry	1	Supply Fan	5.0	86.5%	No			W	5,564	6	No	89.5%	Yes	1	1.5	8,904	0	$1,310	$4,076	$900	2.4

		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
Room C-311 Mechanical Room	AHU-4 - Chemistry Building	1	Supply Fan	100.0	95.8%	Yes			W	5,564		No	95.8%	No		0.0	0	0	$0	$0	$0	0.0
Room C-311 Mechanical Room	AHU-5 - Chemistry Building	1	Supply Fan	100.0	95.8%	Yes			W	5,564		No	95.8%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical Space 2	Cold Water Pump - P1	1	Water Supply Pump	7.5	85.5%	No			W	3,391	8	No	88.5%	Yes	1	0.8	8,829	0	$1,299	$4,909	$1,000	3.0
Basement Mechanical Space 2	Cold Water Pump - P2	1	Water Supply Pump	7.5	87.5%	No			W	3,391	8	No	88.5%	Yes	1	0.8	8,297	0	$1,221	$4,909	$1,000	3.2
Basement Mechanical Space 2	Cold Water Pump - P3	1	Water Supply Pump	5.0	85.5%	No			W	2,745	8	No	86.5%	Yes	1	0.5	4,584	0	$674	$3,987	$900	4.6
Mechanical Rooms	Various Location - Unit Heaters Chemistry Addition	5	Supply Fan	0.1	65.0%	No			W	5,564		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Penthouse	EF 204 - Chemistry Addition	1	Exhaust Fan	0.8	65.0%	No			W	5,564		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Penthouse	AHU-201 - Chemistry Addition	1	Supply Fan	7.5	89.5%	Yes			W	5,564		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Penthouse	AHU-202 - Chemistry Addition	1	Supply Fan	7.5	89.5%	Yes			W	5,564		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Pump Room C034	FCU-202 - Pump Room - Chemistry Addition	1	Fan Coil Unit	1.5	82.5%	No			W	2,745	7	No	82.5%	Yes	1	0.4	1,396	0	$205	$2,936	$75	13.9
Penthouse	EF- 201A, 201B, 201C - Exhaust Control HRU - Chemistry Addition	3	Exhaust Fan	25.0	93.5%	Yes			W	5,564		No	93.5%	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
Electrical Room	Electrical Room	1	Ductless Mini-Split AC	1.50		15.00		Daikin	FTKN18NMVJU	W		No							0.0	0	0	$0	$0	$0	0.0
Room 1-T1 Addition	Room 1-T1 Addition	1	Ductless Mini-Split AC	1.50		15.00		Daikin	FTKN18NMVJU	W		No							0.0	0	0	$0	$0	$0	0.0
Chemistry Addition	Room -C130E, C130F, C033	3	Ductless Mini-Split AC	1.50		17.20		Daikin	RZR18PVJU	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
Central Plant	Building Chilled Water	1	Water-Cooled Centrifugal Chiller	1,001.00	Central Plant	Proxy Chiller	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
Central Plant	Building Space Heating	1	Other	8,061	Central Plant	Proxy Boiler	W		No						0.0	0	0	$0	$0	$0	0.0
Central Plant	Building Chilled Water	1	Other	12,012	Central Plant	Proxy Steam Chiller	W		No						0.0	0	0	$0	$0	$0	0.0

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
Room 002 Pump Room	Chemistry Addition	2	Storage Tank Water Heater (> 50 Gal)	Hubbell	EMV120-85-12SLT4	W		No						0.0	0	0	$0	$0	$0	0.0
Room 002 Pump Room	Chemistry Addition	2	Storage Tank Water Heater (> 50 Gal)	Hubbell	SE65-0-12SLT4	W		No						0.0	0	0	$0	$0	$0	0.0
Central Plant	Physics & Maths Building	1	Indirect System	Central Plant	Proxy Boiler	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
Restrooms	9	32	Faucet Aerator (Lavatory)	2.20	0.50	0.0	26,691	0	$3,927	$229	$128	0.0

Plug Load Inventory

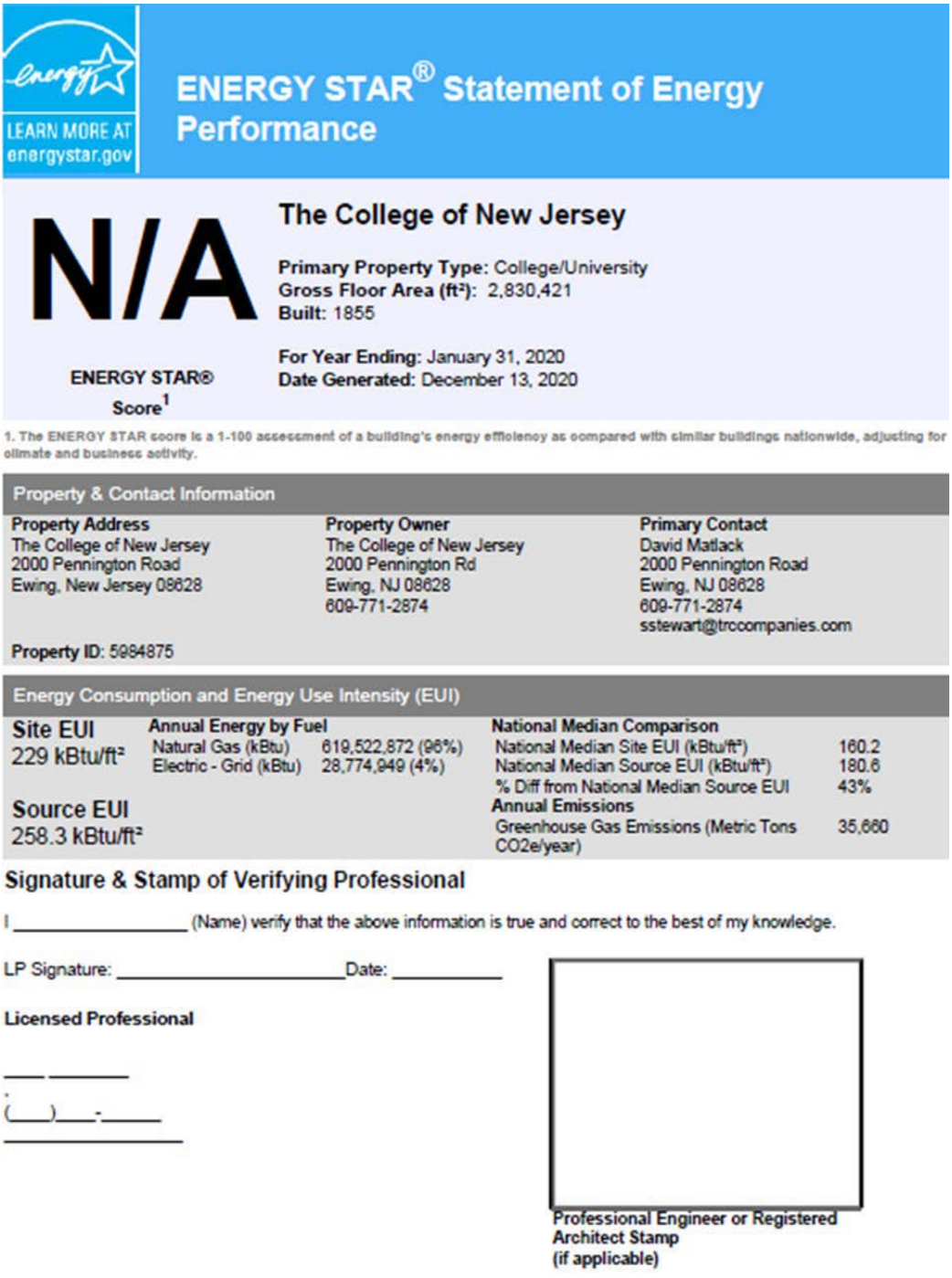
	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Phusics/Maths/Chemistry & Addition	6	Coffee Machine	400	No		
Phusics/Maths/Chemistry & Addition	369	Desktop Computer	120	Yes		
Phusics/Maths/Chemistry & Addition	18	Microwave	1,000	No		
Phusics/Maths/Chemistry & Addition	103	Printer (Medium/Small)	120	Yes		
Phusics/Maths/Chemistry & Addition	9	Printer/Copier (Large)	600	Yes		
Phusics/Maths/Chemistry & Addition	31	Projector	240	Yes		
Phusics/Maths/Chemistry & Addition	8	Lab Refrigerators	450	No		
Phusics/Maths/Chemistry & Addition	4	Television	220	Yes		
Phusics/Maths/Chemistry & Addition	2	Toaster	400	No		
Phusics/Maths/Chemistry & Addition	7	Water Cooler	192	Yes		
Phusics/Maths/Chemistry & Addition	16	Mini Refrigerator	112	Yes		
Phusics/Maths/Chemistry & Addition	8	Residential Style Refrigerator	250	Yes		
Phusics/Maths/Chemistry & Addition	100	Various Lab Plug Load	1,000	No		
Classroom 132 Prep Room	1	Ice Machine	650	No		
Server Closets	4	Server Closets	1,000	No		
Mechanical Room	1	Libert APS UPS	4,000	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
Corridor Vending Machine Area	1	Glass Fronted Refrigerated	10	Yes	0.1	1,209	0	$178	$230	$50	1.0
Corridor Vending Machine Area	1	Non-Refrigerated	N/A	No	0.0	0	0	$0	$0	$0	0.0

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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



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ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

The College of New Jersey

Primary Property Type: College/University
Gross Floor Area (ft²): 2,830,421
Built: 1855

For Year Ending: January 31, 2020
Date Generated: December 13, 2020

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
The College of New Jersey 2000 Pennington Road Ewing, New Jersey 08628	The College of New Jersey 2000 Pennington Rd Ewing, NJ 08628 609-771-2874	David Matlack 2000 Pennington Road Ewing, NJ 08628 609-771-2874 sstewart@trccompanies.com

Property ID: 5984875

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
229 kBtu/ft²

Source EUI
258.3 kBtu/ft²

Annual Energy by Fuel	
Natural Gas (kBtu)	619,522,872 (96%)
Electric - Grid (kBtu)	28,774,949 (4%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	160.2
National Median Source EUI (kBtu/ft²)	180.6
% Diff from National Median Source EUI	43%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	35,660

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, that is implemented in a building system to reduce total energy consumption.
MH	*Metal halide*: a type of HID lamp
MBh	*Thousand Btu per hour*
MBtu	*One thousand British thermal units*
MMBtu	*One million British thermal units*
MV	*Mercury Vapor:* a type of HID lamp
NJBPU	*New Jersey Board of Public Utilities*
NJCEP	*New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money and the environment.
psig	Pounds per square inch gauge
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PV	*Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current).

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR® Portfolio Manager®.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
TREC	*Transition Incentive Renewable Energy Certificate:* a factorized renewable energy certificate 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.