



# Local Government Energy Audit: Energy Audit Report



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***Livingston Town Hall***

**Township of Livingston**

357 S Livingston Ave

Livingston, NJ 07039

June 20, 2018

Final Report by:

**TRC Energy Services**

## Disclaimer

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The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate savings are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC) and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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# I EXECUTIVE SUMMARY

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The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Livingston Town Hall.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey local governments in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

## I.1 Facility Summary

Livingston Town Hall is an 87,377 square foot facility comprised of office areas, meeting halls, courtrooms, and a police station with offices, a jail, locker rooms, and garage areas. The facility was completed in 2010 and houses several of Livingston Townships departments including, engineering, water, permitting, planning and finance.

Lighting at Livingston Town Hall consists of an efficient mix of fluorescents lighting technologies including T5 troffers for the offices and compact fluorescents in the hallways. The facility is less than eight years old and all of the major mechanical equipment is still in good condition.

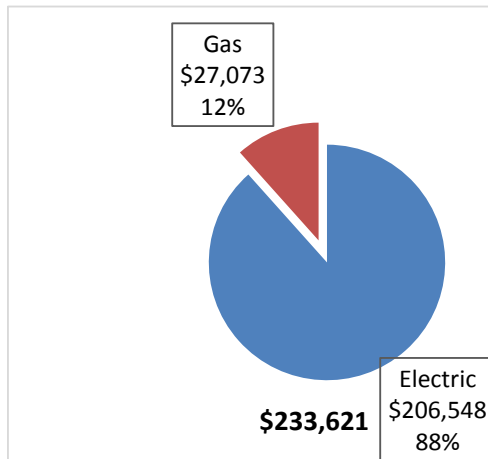
A thorough description of the facility and our observations are located in Section 2.

## I.2 Your Cost Reduction Opportunities

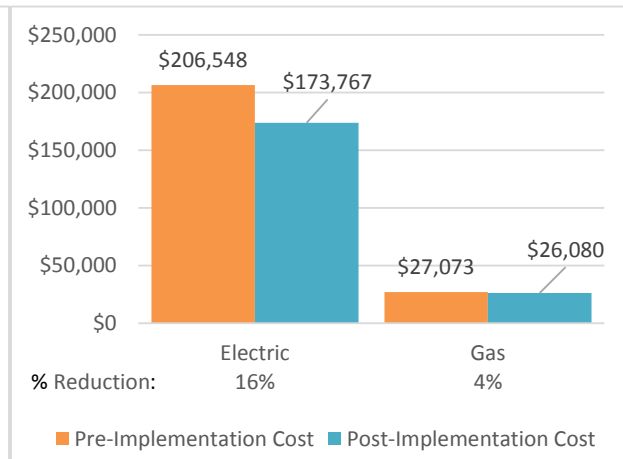
### Energy Conservation Measures

TRC evaluated four measures which together represent an opportunity for Livingston Town Hall to reduce annual energy costs by \$33,774 and annual greenhouse gas emissions by 285,464 lbs CO<sub>2</sub>e. We estimate that if all measures were implemented as recommended, the project would pay for itself in two years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Livingston Town Hall's annual energy use by 11%.

**Figure 1 – Previous 12 Month Utility Costs**



**Figure 2 – Potential Post-Implementation Costs**



A detailed description of Livingston Town Hall’s existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

**Figure 3 – Summary of Energy Reduction Opportunities**

Energy Conservation Measure	Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>267,499</b>	<b>57.0</b>	<b>0.0</b>	<b>\$32,543.12</b>	<b>\$76,254.40</b>	<b>\$11,505.00</b>	<b>\$64,749.40</b>	<b>2.0</b>	<b>269,369</b>
ECM 1   Install LED Fixtures	Yes	6,696	1.3	0.0	\$814.65	\$4,297.45	\$1,100.00	\$3,197.45	3.9	6,743
ECM 2   Retrofit Fixtures with LED Lamps	Yes	260,802	55.8	0.0	\$31,728.47	\$71,956.95	\$10,405.00	\$61,551.95	1.9	262,626
<b>Domestic Water Heating Upgrade</b>		<b>0</b>	<b>0.0</b>	<b>120.7</b>	<b>\$993.23</b>	<b>\$1,633.47</b>	<b>\$0.00</b>	<b>\$1,633.47</b>	<b>1.6</b>	<b>14,127</b>
ECM 3   Install Low-Flow Domestic Hot Water Devices	Yes	0	0.0	120.7	\$993.23	\$1,633.47	\$0.00	\$1,633.47	1.6	14,127
<b>Plug Load Equipment Control - Vending Machine</b>		<b>1,954</b>	<b>0.0</b>	<b>0.0</b>	<b>\$237.76</b>	<b>\$460.00</b>	<b>\$0.00</b>	<b>\$460.00</b>	<b>1.9</b>	<b>1,968</b>
ECM 4   Vending Machine Control	Yes	1,954	0.0	0.0	\$237.76	\$460.00	\$0.00	\$460.00	1.9	1,968
<b>TOTALS</b>		<b>269,453</b>	<b>57.0</b>	<b>120.7</b>	<b>\$33,774.11</b>	<b>\$78,347.87</b>	<b>\$11,505.00</b>	<b>\$66,842.87</b>	<b>2.0</b>	<b>285,464</b>

\* - All incentives presented in this table are based on NJ Smart Start Building 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).

**Lighting Upgrades** generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measure save energy by reducing the power used by the lighting components due to improved electrical efficiency.

**Domestic Hot Water** upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

**Plug Load Equipment** control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlets when not in use.

## Energy Efficient Practices

TRC also identified five low cost (or no cost) energy efficient practices. A facility’s energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Livingston Town Hall include:

- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Perform Boiler Maintenance
- Perform Water Heater Maintenance

For details on these energy efficient practices, please refer to Section 5.

## On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Livingston Town Hall. Based on the configuration of the site and its loads there is a moderate potential for installing a Microturbine CHP system.

*Figure 4 – Combined Heat and Power Potential*

<b>Potential</b>	Medium	
<b>System Type</b>	Microturbine	
<b>System Potential</b>	140	kW
<b>Electric Generation</b>	970,234	kWh/yr
<b>Thermal Generation</b>	5,311,500	MBtu/yr
<b>Displaced Cost</b>	\$61,227	/yr
<b>Installed Cost</b>	\$469,000	

For details on our evaluation and on-site generation potential, please refer to Section 6.

## **I.3 Implementation Planning**

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.



The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Combined Heat and Power Program (CHP)
- Energy Savings Improvement Program (ESIP)

For facilities wanting 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 in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

The Combined Heat & Power Program can be a significant source of funding for this facility since it was identified as a good candidate for CHP on-site generation. As with other programs, please be sure to check the NJCEP website for latest details on current program availability and incentive levels.

Additional information on relevant incentive programs is located in Section 8 or: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci).

## 2 FACILITY INFORMATION AND EXISTING CONDITIONS

### 2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
<b>Customer</b>			
Russell A. Jones	Deputy Township Manager	rjones@livingstonnj.org	(973) 992-5000
<b>Designated Representative</b>			
Esther Lin	Intern	intern2@livingstonnj.org	(973) 992-5000 x5305
<b>TRC Energy Services</b>			
Ignacio Badilla	Auditor	ibadilla@trcsolutions.com	(732) 855-0033

### 2.2 General Site Information

On March 29, 2017, TRC performed an energy audit at Livingston Town Hall located in Livingston, New Jersey. TRC’s team met with Russel Jones to review the facility operations and help focus our investigation on specific energy-using systems.

Livingston Town Hall is an 87,377 square foot facility comprised of office areas, meeting halls, courtrooms, and a police station with offices, a jail, locker rooms, and garage areas. The facility was completed in 2010 and houses several of Livingston Township’s departments including engineering, water, permitting, planning and finance. The facility is divided into three sections, A, B and C. The A wing comprises approximately one third of the total square footage and houses the police station and jail.

Lighting consists of an efficient mix of fluorescent lighting technologies including T5 troffers for the offices and compact fluorescents in the hallways. The facility is less than eight years old and major mechanical equipment is still in good condition.

### 2.3 Building Occupancy

The town hall has an average occupancy of about 50 employees, with an average number of visitors ranging from 50 to 100 depending on the day and season. Tax season, for example, will have higher than average visitors. The facility is also cleaned after hours by an in-house staff.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Town Hall	Weekday	7AM - 4:30
Town Hall	Weekend	Main Area Closed

## 2.4 Building Envelope

The town hall facility is a two-story building of brick construction with three connected segments. The middle segment has a hipped roof with asphalt shingles. The connecting segments have flat roofs with EPDM membrane finish and house mechanical equipment. The north and south sections of the facility have flat roofs with EPDM finishes and hipped roof structure on metallic framing with asphalt shingles.

The windows are double paned and in good condition. There are various door types including overhead garage doors, large double doors for the main entrance, and insulated metal doors on the rear and sides of the building. The weatherstripping, windows, and doors were all inspected and no significant sources of infiltration were found.



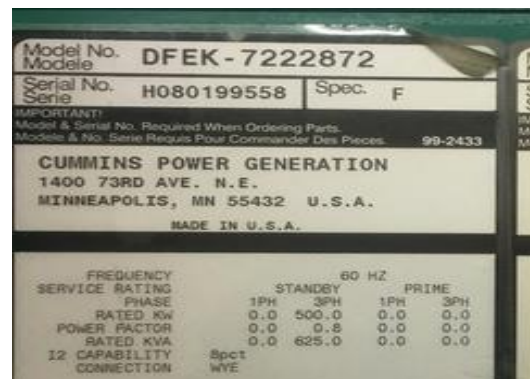
*Facility North Side*



*Facility South Side*

## 2.5 On-Site Generation

Livingston Town Hall installed solar energy in 2010. The total system consists of 198 photovoltaic modules totaling 51,480 watts DC. The system produced 67,119.6 kWh over a one-year period. The facility also has a 500 kW generator.



## 2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

### Lighting System

Lighting is provided 2-foot and 4-foot T5 fixtures with high output lamps. The majority are 2-and 3-lamp, with a few in certain areas with 1- or 4-lamps. The wall sconces and stairwell lighting have been upgraded to LEDs. Hallways are lit by a combination of troffers and compact fluorescent fixtures with pin based tri-tube compact fluorescent lamps. The office areas and bathrooms have also been equipped with occupancy sensors.

The parking lot and wall mounted area lights are all metal halide of varying wattages and are controlled by photocells.



*CFL Fixture*



*T5 HO Fixture*

### Chilled Water or Condenser Water System

The facility is served by two chiller plants located on the roofs of the north and south segments of the building. The chiller on the south side of the facility is a York (MN: YCAL0114EC46XC) 111.1-ton air cooled scroll chiller with an efficiency of .889 Integrated Part Load Value (IPLV) and full load efficiency of 1.165. IPLV is used to measure the efficiency of chillers that are capable of capacity modulation and reflects the efficiency at various output levels. The chiller serves two air handlers also located on the roof, RTU1A and RTU1B, that have 20 and 15 HP supply fans respectively.

The north chiller plant has a York (MN: YCAL0090EEC46XCDBBTC) 83.2-Ton chiller with same efficiency specifications as the south chiller plant. The chiller serves two smaller air handlers, RTU 3B and RTU 3A, with 15 and 10 HP supply fans respectively.



### Hot Water (or Steam) Heating System

The hot water system consists of two high efficiency HB Smith 3102 kBtu/hr output, forced draft boilers. The boilers have a nominal combustion efficiency of 83.1%. Each boiler has an approximately 0.5 HP forced draft fan. The boilers are configured in a constant flow primary distribution with two hot water pumps (HHWP1 & 2). Each boiler is supplied by a dedicated 15 HP pump. The boilers are controlled by the facility’s central Building Management System (BMS). The control system was not accessible on the days the audit was performed however, facility staff report that the system is scheduled for occupied and unoccupied hours. The boilers are eight years old, well maintained and in good condition.



BOILER MODEL	Jacket Length (inches)	NET I=B=R Ratings			L
		Steam (Sq. Ft)	Steam MBH	Water MBH	
28HE-S/W-04	35	2908	698	810	
28HE-S/W-05	43	3733	896	1038	
28HE-S/W-06	51	4625	1110	1268	
28HE-S/W-07	59	5542	1330	1497	
28HE-S/W-08	67	6421	1541	1726	
28HE-S/W-09	75	7275	1746	1956	
28HE-S/W-10	83	8129	1951	2185	
28HE-S/W-11	91	8979	2155	2414	
28HE-S/W-12	99	9833	2360	2643	
28HE-S/W-13	107	10688	2565	2873	
28HE-S/W-14	115	11538	2769	3102	
28HE-S/W-15	123	12392	2974	3331	
28HE-S/W-16	131	13246	3179	3561	
28HE-S/W-17	139	14100	3384	3790	
28HE-S/W-18	147	14954	3589	4019	

### Chilled Water Air Conditioning System (CHW)

The airside system for the facility includes four air handlers (RTU1A, 1B, 3A, 3B) that serve the entire facility through 47 powered Variable Air Volume boxes (VAV) boxes and 32 unpowered VAV boxes. The VAV boxes are capable of varying the airflow to the supply areas and allow for increased energy savings and occupant comfort by only supplying the required amount of cooling.

RTU 1A has a 20 HP supply fan and 15 HP return fan and supplies VAV boxes 1-24 with 6,698 CFM of outside air. The total design supply is 18,300 CFM. The areas served under RTU 1A include the basement and first floor tax offices, Human Resources, Township Manager’s office as well as surrounding areas.

RTU 1B has a 15 HP supply fan and 10 HP return fan and with a design CFM of 12,150 and a fresh air rate of 2,849 CFM. The unit supplies VAV boxes 25–35 which serve areas on the second floor including the superintendent’s office, planning and zoning offices, and the second floor lobby.

RTU 3A has a 15 HP supply fan and 10 HP return fan and with a design CFM of 15,250 and a fresh air rate of 5,550 CFM. The unit supplies VAV boxes 36–53 which serve the basement and first floor areas of the police side of the building.

RTU 3B has a 15 HP supply fan and 10 HP return fan and with a design CFM of 9,600 and a fresh air rate of 1,995 CFM. The unit supplies VAV boxes 54-68 which serve the second floor office areas of the police side of the building.

The units are in good condition and tied to the building EMS. According to facility staff the units are appropriately scheduled with unoccupied and occupied set points.



*Sample Air Handler*



*Sample Nameplate*

### **Direct Expansion Air Conditioning System (DX)**

There are two 25 ton Johnson Controls packaged AC units located on the intermediate roofs. RTU 3 is located on the east side and serves the meeting rooms and courts, the unit (MN: J25WRC00Q4TZZ2003B) is in good condition and has an Energy Efficiency Ratio (EER) of 11. While there are more efficient units available, the unit still has approximately 60% of its useful life left.

The west intermediate roof has a Johnson Controls 25 ton packaged AC Unit (MN: J25WRC00Q4TZZ2003B) that serves the IT areas and 2<sup>nd</sup> floor offices, currently being renovated. The unit has an EER of 11 and is also in good condition. The unit serves the remaining VAV boxes (69-78) and is equipped with hot gas reheat for humidity control of the computer areas.



## **Building Management System (BMS)**

The entire facility is controlled with a building management system (BMS). The BMS controls the facility's major mechanical equipment, and is housed in the township garage. The BMS was not accessible during our site visits.

## **Domestic Hot Water Heating System**

There are three hot water heating systems in the facility. There is one Lochinvar natural gas 200 kBtu/hr storage hot water heater located in the boiler room that serves the town hall area. The unit has a nameplate efficiency of 82% and is in good condition.

The police area is served by two 250-gallon 200 kBtu/hr water heaters with 82% thermal efficiencies and are in good condition. Both heating systems are indirect with a small boiler being used to heat the water. There is one boiler per system.



## **Building Plug Load**

Plug load consists of typical office appliances. There are 180 computer work stations throughout the facility. Ninety percent of the computers are desktop units with LCD monitors.

There are two server rooms located in the IT area of the facility that are cooled by portable air conditioners.

The facility also has some refrigerators and other small kitchen appliances in the break rooms.

## **2.7 Water-Using Systems**

There are 18 restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

### 3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the “typical” energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

#### 3.1 Total Cost of Energy

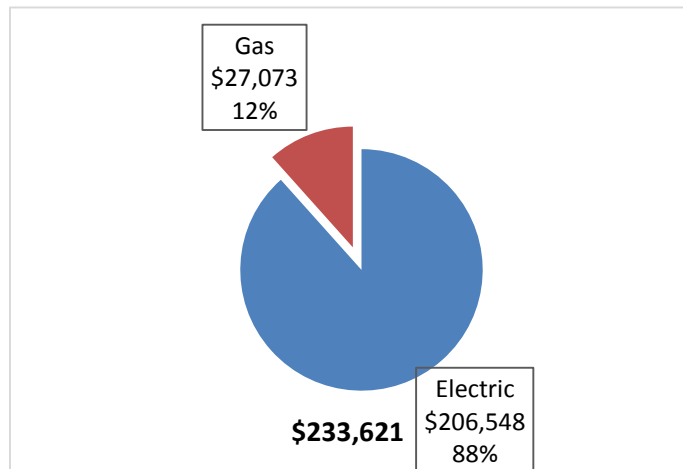
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 7 - Utility Summary*

Utility Summary for Livingston Town Hall		
Fuel	Usage	Cost
Electricity	1,697,786 kWh	\$206,548
Natural Gas	32,889 Therms	\$27,073
<b>Total</b>		<b>\$233,621</b>

The current annual energy cost for this facility is \$251,631 as shown in the chart below.

*Figure 8 - Energy Cost Breakdown*





### 3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost over the past 12 months was \$0.122/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility has a peak demand of 329 kW and is billed demand charges. The monthly electricity consumption and peak demand are shown in the chart below. The spike in June 2015 is due to two combined months of billing by the utility and has been normalized for calculation purposes.

Figure 9 - Electric Usage & Demand

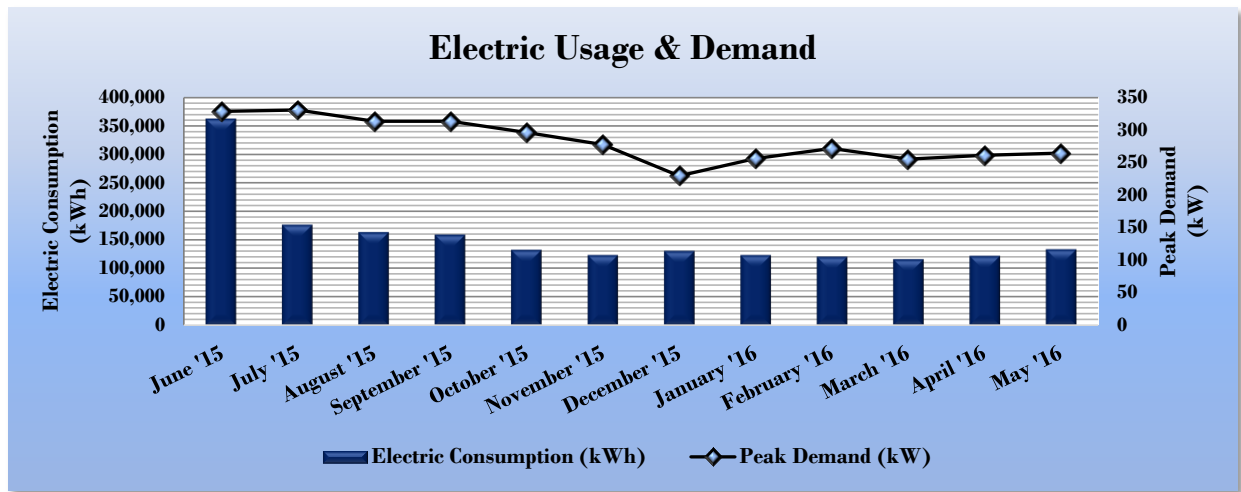


Figure 10 - Electric Usage & Demand

Electric Billing Data for Livingston Town Hall					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/23/15	64	361,135	329	\$1,185	\$46,106
7/23/15	30	176,135	331	\$1,193	\$21,280
8/21/15	29	163,015	314	\$1,131	\$19,641
9/22/15	32	158,640	314	\$1,134	\$18,934
10/21/15	29	132,045	296	\$1,074	\$15,696
11/19/15	29	122,743	278	\$1,006	\$15,671
12/22/15	33	129,990	230	\$832	\$15,705
1/26/16	32	122,660	256	\$928	\$14,779
2/23/16	31	119,890	272	\$986	\$14,309
3/23/16	29	115,700	255	\$933	\$13,753
4/22/16	30	121,173	261	\$957	\$14,355
5/23/16	31	132,810	265	\$970	\$15,559
<b>Totals</b>	<b>399</b>	<b>1,855,936</b>	<b>331</b>	<b>\$12,328</b>	<b>\$225,788</b>
<b>Annual</b>	<b>365</b>	<b>1,697,786</b>	<b>331</b>	<b>\$11,277</b>	<b>\$206,548</b>

### 3.3 Natural Gas Usage

Natural gas is provided by PSEG, the town hall was initially reported to not have a natural gas account, however, this was discovered not be the case onsite. We reached out to the township’s engineering department and billing department, however, they were only able to produce the latest bill for the town hall. The meter number for the natural gas is 2679356, and the account number is 73 391 107 04 for future reference. The library usage was scaled to estimate the town hall’s usage and fuel costs. It should be noted that the actual natural gas usage is unlikely to change the results of the audit since the building and equipment are less than eight years old. The average gas cost for the past 12 months is \$0.823/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Natural Gas Usage

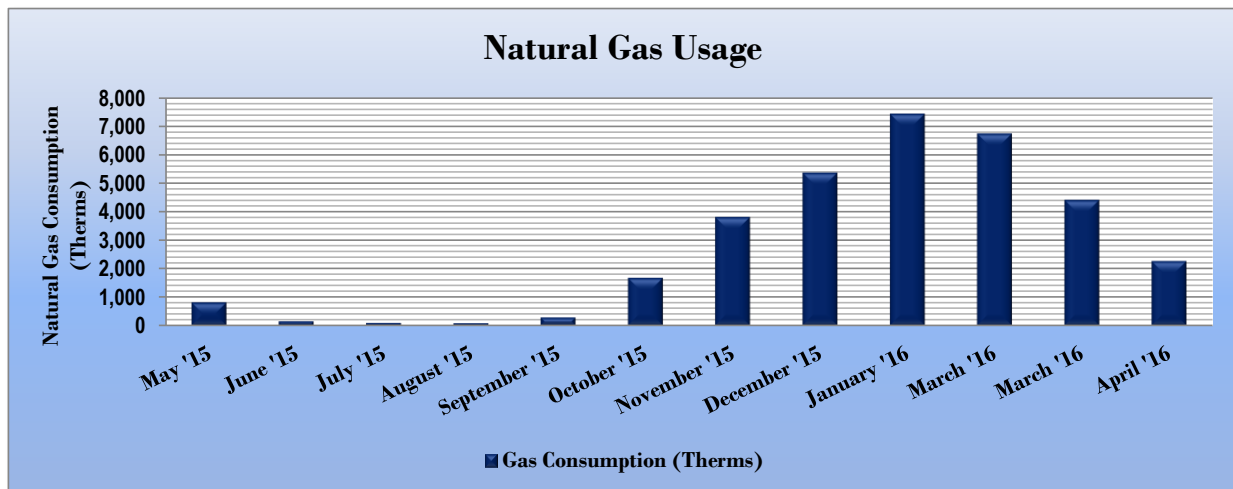


Figure 12 - Natural Gas Usage

Gas Billing Data for Livingston Town Hall				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
6/12/15	30	802	\$602	Yes
7/15/15	33	143	\$232	Yes
8/12/15	29	86	\$200	Yes
9/11/15	30	75	\$195	Yes
10/12/15	29	277	\$306	Yes
11/10/15	31	1,665	\$2,493	Yes
12/11/15	31	3,794	\$3,754	Yes
1/12/16	33	5,348	\$4,790	Yes
2/11/16	29	7,421	\$5,992	Yes
3/16/16	30	6,721	\$4,972	Yes
4/13/16	32	4,396	\$2,311	Yes
5/12/16	29	2,252	\$1,299	Yes
<b>Totals</b>	<b>366</b>	<b>32,979</b>	<b>\$27,147</b>	<b>12</b>
<b>Annual</b>	<b>365</b>	<b>32,889</b>	<b>\$27,073</b>	

### 3.4 Benchmarking

This facility was benchmarked using Portfolio Manager, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager analyzes your building’s consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® score for select building types.

The EUI is a measure of a facility’s energy consumption per square foot, and it is the standard metric for comparing buildings’ energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. 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.

**Figure 13 - Energy Use Intensity Comparison – Existing Conditions**

Energy Use Intensity Comparison - Existing Conditions		
	Livingston Town Hall	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	247.7	148.1
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	103.9	67.3

Implementation of all recommended measures in this report would improve the building’s estimated EUI significantly, as shown in the table below:

**Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures**

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Livingston Town Hall	National Median Building Type: Municipal
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	213.2	148.1
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	92.0	67.3

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. Your building is not is one of the building categories that are eligible to receive a score.

A Portfolio Manager Statement of Energy Performance (SEP) was generated for this facility, see Appendix B: ENERGY STAR® Statement of Energy Performance.

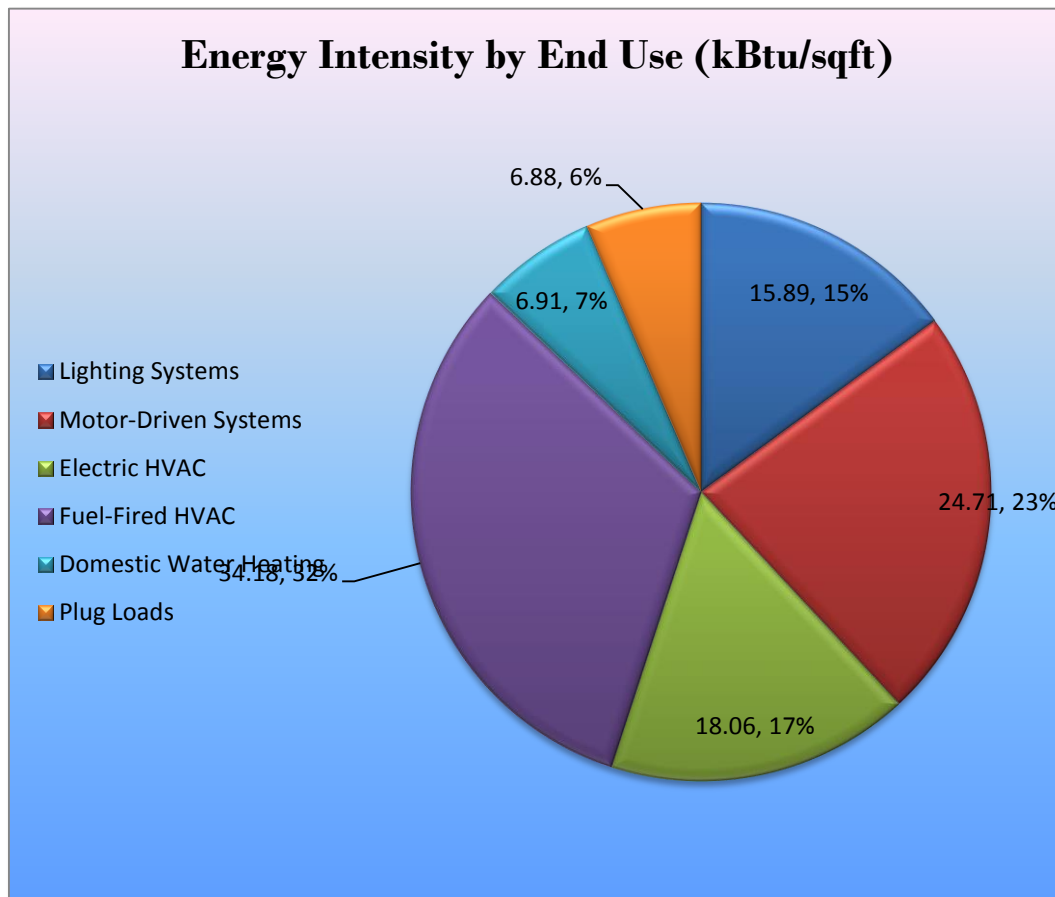
For more information on ENERGY STAR® certification go to: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1>.

A Portfolio Manager account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager regularly, so that you can keep track of your building's performance. 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>.

### 3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 15 - Energy Balance (% and kBtu/SF)



## 4 ENERGY CONSERVATION MEASURES

### Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Livingston Town Hall regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

### 4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

*Figure 16 – Summary of Recommended ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>267,499</b>	<b>57.0</b>	<b>0.0</b>	<b>\$32,543.12</b>	<b>\$76,254.40</b>	<b>\$11,505.00</b>	<b>\$64,749.40</b>	<b>2.0</b>	<b>269,369</b>
ECM 1	Install LED Fixtures	6,696	1.3	0.0	\$814.65	\$4,297.45	\$1,100.00	\$3,197.45	3.9	6,743
ECM 2	Retrofit Fixtures with LED Lamps	260,802	55.8	0.0	\$31,728.47	\$71,956.95	\$10,405.00	\$61,551.95	1.9	262,626
<b>Domestic Water Heating Upgrade</b>		<b>0</b>	<b>0.0</b>	<b>120.7</b>	<b>\$993.23</b>	<b>\$1,633.47</b>	<b>\$0.00</b>	<b>\$1,633.47</b>	<b>1.6</b>	<b>14,127</b>
ECM 3	Install Low-Flow Domestic Hot Water Devices	0	0.0	120.7	\$993.23	\$1,633.47	\$0.00	\$1,633.47	1.6	14,127
<b>Plug Load Equipment Control - Vending Machine</b>		<b>1,954</b>	<b>0.0</b>	<b>0.0</b>	<b>\$237.76</b>	<b>\$460.00</b>	<b>\$0.00</b>	<b>\$460.00</b>	<b>1.9</b>	<b>1,968</b>
ECM 4	Vending Machine Control	1,954	0.0	0.0	\$237.76	\$460.00	\$0.00	\$460.00	1.9	1,968
<b>TOTALS</b>		<b>269,453</b>	<b>57.0</b>	<b>120.7</b>	<b>\$33,774.11</b>	<b>\$78,347.87</b>	<b>\$11,505.00</b>	<b>\$66,842.87</b>	<b>2.0</b>	<b>285,464</b>

\* - All incentives presented in this table are based on NJ Smart Start Building 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).

## 4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 17 below.

*Figure 17 – Summary of Lighting Upgrade ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>267,499</b>	<b>57.0</b>	<b>0.0</b>	<b>\$32,543.12</b>	<b>\$76,254.40</b>	<b>\$11,505.00</b>	<b>\$64,749.40</b>	<b>2.0</b>	<b>269,369</b>
ECM 1	Install LED Fixtures	6,696	1.3	0.0	\$814.65	\$4,297.45	\$1,100.00	\$3,197.45	3.9	6,743
ECM 2	Retrofit Fixtures with LED Lamps	260,802	55.8	0.0	\$31,728.47	\$71,956.95	\$10,405.00	\$61,551.95	1.9	262,626

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

### ECM 1: Install LED Fixtures

#### *Summary of Measure Economics*

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
Interior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0
Exterior	6,696	1.3	0.0	\$814.65	\$4,297.45	\$1,100.00	\$3,197.45	3.9	6,743

#### *Measure Description*

We recommend replacing the exterior wall mounted area lights with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than ten times longer than many incandescent lamps.

## **ECM 2: Retrofit Fixtures with LED Lamps**

### *Summary of Measure Economics*

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
Interior	260,802	55.8	0.0	\$31,728.47	\$71,956.95	\$10,405.00	\$61,551.95	1.9	262,626
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

### *Measure Description*

We recommend retrofitting the existing compact fluorescent fixtures and T5 fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs 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.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than ten times longer than many incandescent lamps.



## 4.1.2 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 18 below.

*Figure 18 - Summary of Domestic Water Heating ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>		<b>0</b>	<b>0.0</b>	<b>120.7</b>	<b>\$993.23</b>	<b>\$1,633.47</b>	<b>\$0.00</b>	<b>\$1,633.47</b>	<b>1.6</b>	<b>14,127</b>
ECM 3	Install Low-Flow Domestic Hot Water Devices	0	0.0	120.7	\$993.23	\$1,633.47	\$0.00	\$1,633.47	1.6	14,127

### **ECM 3: Install Low-Flow DHW Devices**

#### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
0	0.0	120.7	\$993.23	\$1,633.47	\$0.00	\$1,633.47	1.6	14,127

#### *Measure Description*

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy.

### 4.1.3 Plug Load Equipment Control - Vending Machines

Our recommendations for plug equipment load controls is summarized in Figure 19 below.

**Figure 19 - Summary of Plug Load Control ECMs**

Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Natural Gas Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual N/A Savings (MMBtu)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
Plug Load Equipment Control - Vending Machine	1,954	0.0	0.0	0.0	0.0	0.0	\$237.76	\$460.00	\$0.00	\$460.00	1.9	1,968
ECM 4   Vending Machine Control	1,954	0.0	0.0	0.0	0.0	0.0	\$237.76	\$460.00	\$0.00	\$460.00	1.9	1,968

#### ECM 4: Vending Machine Control

##### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
1,954	0.0	0.0	\$237.76	\$460.00	\$0.00	\$460.00	1.9	1,968

##### *Measure Description*

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

## 5 ENERGY EFFICIENT PRACTICES

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In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

### **Perform Lighting Maintenance**

In order to sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20% - 60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6 – 12 months.

### **Develop a Lighting Maintenance Schedule**

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

### **Perform Routine Motor Maintenance**

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of 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.

### **Perform Boiler Maintenance**

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

## **Perform Water Heater Maintenance**

At least once a year, 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. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any 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 any 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 over three to four years old have a technician inspect the sacrificial anode annually.

## 6 ON-SITE GENERATION MEASURES

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey’s Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State’s electrical needs to be met by renewable sources by 2050.

Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at 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.

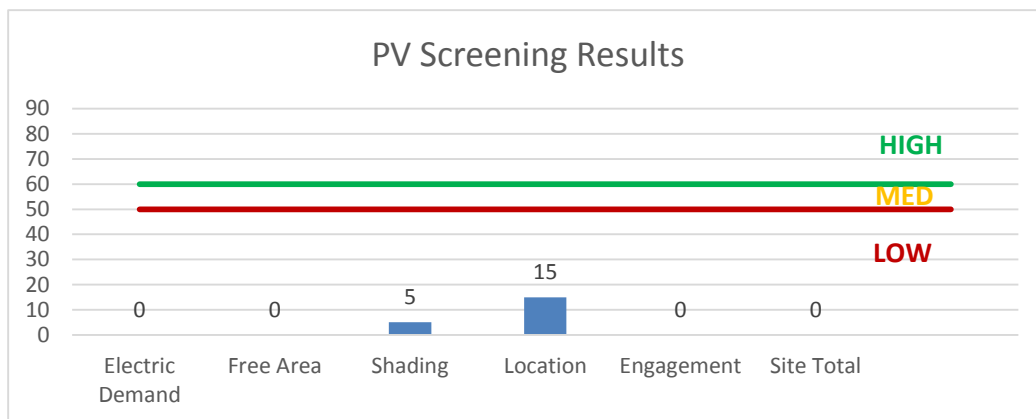
### 6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility’s electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

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

The majority of the available space has been used to site the original solar installation, there is still one area left where solar could be installed but it’s limited and in our opinion, the facility could benefit more from a combined heat and power application.

**Figure 20 - Photovoltaic Screening**



For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ:** <http://www.njcleanenergy.com/whysolar>
- **NJ Solar Market FAQs:** <http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs>
- **Approved Solar Installers in the NJ Market:** [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved\\_vendorsearch/?id=60&start=1](http://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) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

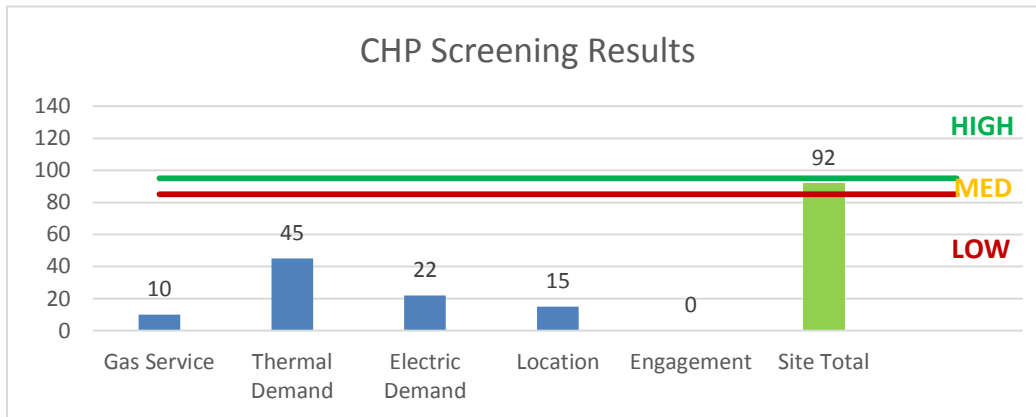
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use 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 a medium potential for installing a cost-effective CHP system.

The magnitude, type, and duration of the thermal demand, the coincident electric load, and the ease of interconnection contribute to the potential for CHP at the site. Based on the amount of steam/hot water used throughout the year and the concurrent electric demand a gas turbine/reciprocating engine/microturbine/fuel cell may be feasible. If Livingston Town Hall is interested in pursuing the installation of CHP, we recommended a more detailed feasibility study be conducted.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved\\_vendorsearch/.](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/)

Figure 21 - Combined Heat and Power Screening



<b>Potential</b>	Medium	
<b>System Type</b>	Microturbine	
<b>System Potential</b>	140	kW
<b>Electric Generation</b>	970,234	kWh/yr
<b>Thermal Generation</b>	5,311,500	MBtu/yr
<b>Displaced Cost</b>	\$61,227	/yr
<b>Installed Cost</b>	\$469,000	

Please see Section 8.2 for additional information in the Combined Heat & Power Program.

## 7 DEMAND RESPONSE

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Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage 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 DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

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

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

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

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (<http://www.pjm.com/markets-and-operations/demand-response/csps.aspx>). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (<http://www.pjm.com/training/training%20material.aspx>), along with a variety of other DR program information.

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



## 8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 22 for a list of the eligible programs identified for each recommended ECM.

*Figure 22 - ECM Incentive Program Eligibility*

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x					
ECM 2	Retrofit Fixtures with LED Lamps	x					
ECM 3	Install Low-Flow Domestic Hot Water Devices						
ECM 4	Vending Machine Control	x					

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci).

## 8.1 SmartStart

### Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency 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*

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

### Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom measure incentives are calculated at \$0.16/kWh and \$1.60/therm based on estimated annual savings, 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

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: [www.njcleanenergy.com/SSB](http://www.njcleanenergy.com/SSB).

## 8.2 Combined Heat and Power Program

### Overview

One of the goals of the State of New Jersey is to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat, and to reduce existing and new demands to the electric power grid. The Combined Heat & Power (CHP) program provides incentives for eligible CHP or Waste Heat to Power (WHP) projects. Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 65% (Lower Heating Value - 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)	Incentive (\$/kW)	% of Total Cost Cap per Project <sup>3</sup>	\$ Cap per Project <sup>3</sup>	
Powered by non-renewable or renewable fuel source <sup>4</sup>	≤500 kW	\$2,000	30-40% <sup>2</sup>	\$2 million	
	Gas Internal Combustion Engine	>500 kW - 1 MW			\$1,000
	Gas Combustion Turbine	> 1 MW - 3 MW	\$550	30%	\$3 million
	Microturbine	>3 MW	\$350		
	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, 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](http://www.njcleanenergy.com/CHP).

### 8.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. 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. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. 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 can be leveraged to help further reduce the total project cost of eligible measures.

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 utilized 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. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program description and application can be found at: [www.njcleanenergy.com/ESIP](http://www.njcleanenergy.com/ESIP).

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

## 9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

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### 9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party (i.e., non-utility) energy supplier.

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 is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).

### 9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. 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 is typically dependent upon whether a customer seeks 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 is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).

# Appendix A: Equipment Inventory & Recommendations

## Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years	
2nd floor unfinished hall	7	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	1,500	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	1,500	0.38	795	0.0	\$96.71	\$409.50	\$70.00	3.51	
open area unfinished	35	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	1,500	Relamp	No	35	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	1,500	1.91	3,975	0.0	\$483.56	\$2,047.50	\$350.00	3.51	
server room	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37	
stairwells (3)	21	LED - Fixtures: Wall Sconces	None	16	3,848	None	No	21	LED - Fixtures: Wall Sconces	None	16	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00	
bathroom	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.06	304	0.0	\$37.03	\$96.40	\$20.00	2.06	
men's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.11	408	0.0	\$49.62	\$117.00	\$20.00	1.95	
men's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95	
men's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56	
women's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.11	408	0.0	\$49.62	\$117.00	\$20.00	1.95	
women's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95	
women's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56	
janitorial closet	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95	
IT office	3	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.09	457	0.0	\$55.54	\$144.60	\$30.00	2.06	
B207	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06	
server room	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06	
IT manager office	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	None	234	3,848	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	None	100	3,848	0.22	1,165	0.0	\$141.77	\$190.27	\$40.00	1.06	
2nd floor lobby	9	LED - Fixtures: Wall Sconces	None	16	3,848	None	No	9	LED - Fixtures: Wall Sconces	None	16	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00	
2nd floor lobby	4	Compact Fluorescent pendant 6L	None	108	3,848	Relamp	No	4	LED Screw-In Lamps: Pin Based LED	None	15	3,848	0.30	1,618	0.0	\$196.79	\$1,878.07	\$0.00	9.54	
engineering and planning	20	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	20	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	1.69	9,044	0.0	\$1,100.31	\$1,504.00	\$300.00	1.09	
engineering and planning	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06	
A201	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56	
A202	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56	
A203	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56	
A204	12	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.34	1,826	0.0	\$222.18	\$578.40	\$120.00	2.06	
A206	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.05	204	0.0	\$24.81	\$58.50	\$10.00	1.95	

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
A207	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.05	204	0.0	\$24.81	\$58.50	\$10.00	1.95
A212	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.08	317	0.0	\$38.51	\$75.20	\$15.00	1.56
Public Works	2	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	2	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.09	496	0.0	\$60.31	\$313.01	\$0.00	5.19
Public works	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.08	452	0.0	\$55.02	\$75.20	\$15.00	1.09
public works	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
S226	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.16	612	0.0	\$74.43	\$175.50	\$30.00	1.95
A218	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.16	612	0.0	\$74.43	\$175.50	\$30.00	1.95
Conference	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
A220	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
Hallway	4	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	None	52	3,848	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	None	17	3,848	0.11	609	0.0	\$74.06	\$192.80	\$40.00	2.06
men's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.11	408	0.0	\$49.62	\$117.00	\$20.00	1.95
men's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
men's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
women's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.11	408	0.0	\$49.62	\$117.00	\$20.00	1.95
women's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
women's bathroom	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
A227	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Occupancy Sensor	62	2,694	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,694	0.04	145	0.0	\$17.59	\$35.90	\$5.00	1.76
A228	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.25	950	0.0	\$115.53	\$225.60	\$45.00	1.56
Building Dept.	31	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	31	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	1.69	9,031	0.0	\$1,098.72	\$1,813.50	\$310.00	1.37
Building Dept.	12	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.34	1,826	0.0	\$222.18	\$578.40	\$120.00	2.06
A233	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.33	1,224	0.0	\$148.86	\$351.00	\$60.00	1.95
A231	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.22	816	0.0	\$99.24	\$234.00	\$40.00	1.95
A232	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.33	1,224	0.0	\$148.86	\$351.00	\$60.00	1.95
Copy Room	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.22	816	0.0	\$99.24	\$234.00	\$40.00	1.95
building dept.	3	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	3	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.14	744	0.0	\$90.46	\$469.52	\$0.00	5.19

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
municipal Ct.	18	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	1.52	8,140	0.0	\$990.28	\$1,353.60	\$270.00	1.09
municipal Ct.	4	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	4	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.11	609	0.0	\$74.06	\$192.80	\$40.00	2.06
municipal Ct.	4	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	4	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.19	991	0.0	\$120.61	\$626.02	\$0.00	5.19
prosecutor's office	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
B116	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
Court Room	25	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	25	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	1.16	6,196	0.0	\$753.82	\$3,912.65	\$0.00	5.19
Court Room	25	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	25	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.97	5,164	0.0	\$628.18	\$897.50	\$125.00	1.23
Judge	12	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	12	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.56	2,974	0.0	\$361.83	\$1,878.07	\$0.00	5.19
B114	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.08	413	0.0	\$50.25	\$71.80	\$10.00	1.23
B106	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.06	304	0.0	\$37.03	\$96.40	\$20.00	2.06
B107	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06
B108	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06
Bathroom	1	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.05	248	0.0	\$30.15	\$156.51	\$0.00	5.19
Bathroom	1	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.05	248	0.0	\$30.15	\$156.51	\$0.00	5.19
Server room	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.17	904	0.0	\$110.03	\$150.40	\$30.00	1.09
hallway to police	3	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.09	457	0.0	\$55.54	\$144.60	\$30.00	2.06
1st floor conference	12	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.65	3,496	0.0	\$425.31	\$702.00	\$120.00	1.37
hallway	4	Compact Fluorescent: pendant 6L	Wall Switch	108	3,848	Relamp	No	4	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.30	1,618	0.0	\$196.79	\$1,878.07	\$0.00	9.54
hallway	4	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	4	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.19	991	0.0	\$120.61	\$626.02	\$0.00	5.19
hallway	6	LED - Fixtures: Wall Sconces	Wall Switch	16	3,848	None	No	6	LED - Fixtures: Wall Sconces	Wall Switch	16	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
B126	16	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	16	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.87	4,661	0.0	\$567.08	\$936.00	\$160.00	1.37
men's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
men's bathroom	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.16	612	0.0	\$74.43	\$175.50	\$30.00	1.95
men's bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	2,694	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	100	2,694	0.11	408	0.0	\$49.62	\$95.13	\$20.00	1.51
women's bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95



Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
women's bathroom	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.16	612	0.0	\$74.43	\$175.50	\$30.00	1.95
women's bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Occupancy Sensor	234	2,694	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	100	2,694	0.11	408	0.0	\$49.62	\$95.13	\$20.00	1.51
B119	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.05	204	0.0	\$24.81	\$58.50	\$10.00	1.95
Display case	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.12	620	0.0	\$75.38	\$107.70	\$15.00	1.23
town manager's office	19	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	19	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.54	2,024	0.0	\$246.25	\$915.80	\$190.00	2.95
A141	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
A140	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
A138	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
A137	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
A132	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56
A134	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
clerks	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
clerks	14	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	14	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.40	1,491	0.0	\$181.45	\$674.80	\$140.00	2.95
A122	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
A118	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.26	959	0.0	\$116.64	\$433.80	\$90.00	2.95
Mail Room	5	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.42	1,583	0.0	\$192.55	\$376.00	\$75.00	1.56
A130	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.22	816	0.0	\$99.24	\$234.00	\$40.00	1.95
men's bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.05	204	0.0	\$24.81	\$58.50	\$10.00	1.95
men's bathroom	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.06	213	0.0	\$25.92	\$96.40	\$20.00	2.95
men's bathroom	1	Compact Fluorescent: DL 2 Lamp	Occupancy Sensor	72	2,694	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Occupancy Sensor	15	2,694	0.05	173	0.0	\$21.11	\$156.51	\$0.00	7.41
women's bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.05	204	0.0	\$24.81	\$58.50	\$10.00	1.95
women's bathroom	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.06	213	0.0	\$25.92	\$96.40	\$20.00	2.95
women's bathroom	1	Compact Fluorescent: DL 2 Lamp	Occupancy Sensor	72	2,694	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Occupancy Sensor	15	2,694	0.05	173	0.0	\$21.11	\$156.51	\$0.00	7.41
electrical	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 5L	Occupancy Sensor	296	2,694	Relamp	No	2	LED - Linear Tubes: (5) 4' Lamps	Occupancy Sensor	125	2,694	0.28	1,041	0.0	\$126.64	\$229.57	\$50.00	1.42
telecom	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
A114	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
A114	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
A110	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56
A112	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.17	633	0.0	\$77.02	\$150.40	\$30.00	1.56
A101	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56
A104	12	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.34	1,278	0.0	\$155.52	\$578.40	\$120.00	2.95
A103	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.34	1,266	0.0	\$154.04	\$300.80	\$60.00	1.56
A107	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	0.25	950	0.0	\$115.53	\$225.60	\$45.00	1.56
Main office	18	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Occupancy Sensor	179	2,694	Relamp	No	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	75	2,694	1.52	5,698	0.0	\$693.19	\$1,353.60	\$270.00	1.56
Main office	12	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	12	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.34	1,278	0.0	\$155.52	\$578.40	\$120.00	2.95
basement storage	39	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	3,848	Relamp	No	39	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	100	3,848	4.25	22,724	0.0	\$2,764.53	\$3,710.20	\$780.00	1.06
A012	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.08	413	0.0	\$50.25	\$71.80	\$10.00	1.23
Bathroom1	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
bathroom2	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Occupancy Sensor	52	2,694	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,694	0.03	107	0.0	\$12.96	\$48.20	\$10.00	2.95
janitors	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.11	408	0.0	\$49.62	\$117.00	\$20.00	1.95
A009	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	2,694	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	50	2,694	0.22	816	0.0	\$99.24	\$234.00	\$40.00	1.95
A010	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.15	826	0.0	\$100.51	\$143.60	\$20.00	1.23
A001	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.23	1,239	0.0	\$150.76	\$215.40	\$30.00	1.23
A002	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
Police entrance	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.06	304	0.0	\$37.03	\$96.40	\$20.00	2.06
lobby	7	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	7	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.20	1,065	0.0	\$129.60	\$337.40	\$70.00	2.06
hallway	21	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	21	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.60	3,196	0.0	\$388.81	\$1,012.20	\$210.00	2.06
hallway	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
main office	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.51	2,713	0.0	\$330.09	\$451.20	\$90.00	1.09
c106	15	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	15	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	1.27	6,783	0.0	\$825.23	\$1,128.00	\$225.00	1.09

Location	Existing Conditions					Proposed Conditions					Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
c109	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
c112	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
bathroom	1	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.05	248	0.0	\$30.15	\$156.51	\$0.00	5.19
bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
bathroom	1	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.05	248	0.0	\$30.15	\$156.51	\$0.00	5.19
bathroom	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C110	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C116	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
C118	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C119	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C123	11	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	11	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.60	3,205	0.0	\$389.87	\$643.50	\$110.00	1.37
C123	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
C105	5	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.27	1,457	0.0	\$177.21	\$292.50	\$50.00	1.37
office	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
garage	22	Metal Halide: (1) 100W Lamp	Wall Switch	128	1,200	LED Retrofit	No	22	LED Screw-In Lamps: Corn Bulbs	Wall Switch	50	1,200	1.40	2,327	0.0	\$283.08	\$2,200.00	\$0.00	7.77
processing1	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.33	1,748	0.0	\$212.66	\$351.00	\$60.00	1.37
processing2	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.33	1,748	0.0	\$212.66	\$351.00	\$60.00	1.37
jails	8	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	8	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.23	1,218	0.0	\$148.12	\$385.60	\$80.00	2.06
interrogation 1	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
interrogation 2	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
jail 1	4	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	None	No	4	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
juvenile	7	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	None	No	7	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
bathroom	1	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	8	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
south cell	9	LED - Fixtures: Ceiling Mount	Wall Switch	16	3,848	None	No	9	LED - Fixtures: Ceiling Mount	Wall Switch	16	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
north cell	6	LED - Fixtures: Ceiling Mount	Wall Switch	16	3,848	None	No	6	LED - Fixtures: Ceiling Mount	Wall Switch	16	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

Location	Existing Conditions					Proposed Conditions					Energy Impact & Financial Analysis								
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
bathroom	1	Linear Fluorescent - T5HO: 2' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
shower1	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
office *matrons	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
Prisoner Garage	12	Metal Halide: (1) 100W Lamp	Wall Switch	128	1,200	LED Retrofit	No	12	LED Screw-In Lamps: Corn Bulbs	Wall Switch	50	1,200	0.76	1,269	0.0	\$154.41	\$1,200.00	\$0.00	7.77
Evidence room	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
men's auxiliary locker	5	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	5	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.14	761	0.0	\$92.57	\$241.00	\$50.00	2.06
men's auxiliary locker	9	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	9	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.26	1,370	0.0	\$166.63	\$433.80	\$90.00	2.06
C034	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
C034	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.17	904	0.0	\$110.03	\$150.40	\$30.00	1.09
female auxiliary	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
female auxiliary	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
female auxiliary	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.17	904	0.0	\$110.03	\$150.40	\$30.00	1.09
men's supervisor's locker	3	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	3	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.09	457	0.0	\$55.54	\$144.60	\$30.00	2.06
men's supervisor's locker	7	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.38	2,039	0.0	\$248.10	\$409.50	\$70.00	1.37
men's supervisor's locker	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	6	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.51	2,713	0.0	\$330.09	\$451.20	\$90.00	1.09
men's supervisor's locker	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 1L	Wall Switch	62	3,848	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,848	0.08	413	0.0	\$50.25	\$71.80	\$10.00	1.23
Men's locker2	7	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	7	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.38	2,039	0.0	\$248.10	\$409.50	\$70.00	1.37
female officer's locker	5	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	5	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.27	1,457	0.0	\$177.21	\$292.50	\$50.00	1.37
female supervisors locker	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
main locker	15	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	15	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.82	4,370	0.0	\$531.64	\$877.50	\$150.00	1.37
main locker	6	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	6	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.17	913	0.0	\$111.09	\$289.20	\$60.00	2.06
hallway	5	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	5	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.14	761	0.0	\$92.57	\$241.00	\$50.00	2.06
c007	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C002	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C001	12	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.65	3,496	0.0	\$425.31	\$702.00	\$120.00	1.37

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
lunch room	8	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	8	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.44	2,331	0.0	\$283.54	\$468.00	\$80.00	1.37
C015	9	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.49	2,622	0.0	\$318.98	\$526.50	\$90.00	1.37
C015	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
C012	1	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.03	152	0.0	\$18.51	\$48.20	\$10.00	2.06
mechanical room	7	Metal Halide: (1) 100W Lamp	Wall Switch	128	3,848	LED Retrofit	No	7	LED Screw-In Lamps: Corn Bulbs	Wall Switch	50	3,848	0.44	2,374	0.0	\$288.83	\$700.00	\$0.00	2.42
2nd floor lobby	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.06	304	0.0	\$37.03	\$96.40	\$20.00	2.06
hallway	10	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	10	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.28	1,522	0.0	\$185.15	\$482.00	\$100.00	2.06
records	13	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.71	3,787	0.0	\$460.75	\$760.50	\$130.00	1.37
storage	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C216	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C219	13	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	13	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.71	3,787	0.0	\$460.75	\$760.50	\$130.00	1.37
oC214	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.22	1,165	0.0	\$141.77	\$234.00	\$40.00	1.37
server room	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C234	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C233	14	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	14	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.76	4,079	0.0	\$496.20	\$819.00	\$140.00	1.37
C233	9	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	9	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.49	2,622	0.0	\$318.98	\$526.50	\$90.00	1.37
C232	2	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.06	304	0.0	\$37.03	\$96.40	\$20.00	2.06
C230	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C231	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C228	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
cpu office	6	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.33	1,748	0.0	\$212.66	\$351.00	\$60.00	1.37
mens	1	Compact Fluorescent: DL 2 Lamp	Wall Switch	72	3,848	Relamp	No	1	LED Screw-In Lamps: Pin Based LED	Wall Switch	15	3,848	0.05	248	0.0	\$30.15	\$156.51	\$0.00	5.19
mens	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
mens	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	3,848	Relamp	No	2	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	100	3,848	0.22	1,165	0.0	\$141.77	\$190.27	\$40.00	1.06
womens	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37

Location	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
C226	1	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.05	291	0.0	\$35.44	\$58.50	\$10.00	1.37
C217	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
C225	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.22	1,165	0.0	\$141.77	\$234.00	\$40.00	1.37
Chiefs area	12	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	12	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.65	3,496	0.0	\$425.31	\$702.00	\$120.00	1.37
C210	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.11	583	0.0	\$70.89	\$117.00	\$20.00	1.37
C213	2	Linear Fluorescent - T5HO: 4' T5HO (54W) - 3L	Wall Switch	179	3,848	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	75	3,848	0.17	904	0.0	\$110.03	\$150.40	\$30.00	1.09
C209	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
C208	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.16	874	0.0	\$106.33	\$175.50	\$30.00	1.37
C201	11	Linear Fluorescent - T5HO: 2' T5HO (24W) - 2L	Wall Switch	52	3,848	Relamp	No	11	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	3,848	0.31	1,674	0.0	\$203.66	\$530.20	\$110.00	2.06
C203	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Wall Switch	117	3,848	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	50	3,848	0.22	1,165	0.0	\$141.77	\$234.00	\$40.00	1.37
parking	20	Metal Halide: (1) 150W Lamp	None	190	3,848	None	No	20	Metal Halide: (1) 150W Lamp	None	190	3,848	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
exterior	11	Metal Halide: (1) 150W Lamp	None	190	3,848	Fixture Replacement	No	11	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	50	3,848	1.25	6,696	0.0	\$814.65	\$4,297.45	\$1,100.00	3.92

### Motor Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
UH-1	A001	11	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-2	A002	1	Supply Fan	0.0	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-3	A003	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-4	C010	1	Supply Fan	0.0	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-5	C120	1	Supply Fan	0.3	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-6	C120	1	Supply Fan	0.3	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-7	C151	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
UH-8	C151	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-1	stair 2	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-2	A115	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-3	entry	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-4	vest C101	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-5	stair 3	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-6	stair 4	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-7	egress A109	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-8	St-05	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-9	C204A	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
CU-10	C204A	1	Supply Fan	0.1	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	A&B&C	12	Supply Fan	0.2	75.0%	No	5,000	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	A&B&C	11	Supply Fan	0.3	75.0%	No	5,000	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

		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?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
various	A&B&C	15	Supply Fan	0.3	75.0%	No	5,000	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	A&B&C	4	Supply Fan	1.0	75.0%	No	5,000	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	A&B&C	5	Supply Fan	0.8	75.0%	No	2,745	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	10	Exhaust Fan	0.2	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	2	Exhaust Fan	0.3	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	9	Exhaust Fan	0.1	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	4	Exhaust Fan	0.1	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	1	Exhaust Fan	0.3	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	1	Exhaust Fan	0.5	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
various	various	1	Exhaust Fan	1.0	75.0%	No	8,760	No	75.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
boiler room	boilers	2	Heating Hot Water Pump	15.0	92.4%	No	3,391	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
roof	chillers	4	Chilled Water Pump	7.5	87.5%	No	3,391	No	87.5%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Town Hall Roof	Town Hall Area	1	Supply Fan	20.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Town Hall Roof	Town Hall Area	1	Return Fan	15.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Town Hall Roof	Town Hall Area	1	Supply Fan	15.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Town Hall Roof	Town Hall Area	1	Return Fan	10.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Police Station Roof	police building	1	Supply Fan	15.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Police Station Roof	police building	1	Return Fan	10.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Police Station Roof	police building	1	Supply Fan	15.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Police Station Roof	police building	1	Return Fan	10.0	92.4%	no	8,760	No	92.4%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00



Location	Area(s)/System(s) Served	Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
		Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
DHW	all	3	Other	0.2	65.0%	No	2,745	No	65.0%	No		0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions							Proposed Conditions					Energy Impact & Financial Analysis						
		System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Roof Area By offices	Courts & Court offices	1	Packaged AC	25.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof Area by IT	IT Area	1	Packaged AC	25.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
server room	Server Room	2	Through-The-Wall AC	1.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
police roof	offices	2	Split-System AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Electric Chiller Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions						Energy Impact & Financial Analysis						
		Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Town Hall Roof	Town Hall side	1	Air-Cooled Scroll Chiller	111.10	No							0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof by Police	Police Side	1	Air-Cooled Scroll Chiller	83.20	No							0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Fuel Heating Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions							Energy Impact & Financial Analysis						
		System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	whole building	2	Non-Condensing Hot Water Boiler	3,102.00	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
		System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
boiler room town hall	Town Hall	1	Indirect System	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
mechanical room police	Police	2	Indirect System	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Low-Flow Device Recommendations

Location	Recommendation Inputs				Energy Impact & Financial Analysis							
	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	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years	
Throughout	41	Faucet Aerator (Lavatory)	2.20	1.00	0.00	0	71.9	\$592.08	\$293.97	\$0.00	0.50	
lockerrooms	15	Showerhead	4.00	2.00	0.00	0	48.7	\$401.14	\$1,339.50	\$0.00	3.34	

### Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
offices	195	Computers	250.0	NO
offices	15	copy	400.0	NO
Server Rooms	2	Servers	2,500.0	No
Breakroom	2	Refrigerators	350.0	NO

### Vending Machine Inventory & Recommendations

Location	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
first floor hallway	1	Non-Refrigerated	Yes	0.00	343	0.0	\$41.67	\$230.00	\$0.00	5.52
first floor hallway	1	Refrigerated	Yes	0.00	1,612	0.0	\$196.09	\$230.00	\$0.00	1.17

## Appendix B: ENERGY STAR® Statement of Energy Performance

# ENERGY STAR® Statement of Energy Performance

LEARN MORE AT [energystar.gov](http://energystar.gov)

N/A

### Livingston Town Hall

**Primary Property Type:** Other - Public Services  
**Gross Floor Area (ft²):** 87,377  
**Built:** 2010

**For Year Ending:** April 30, 2016  
**Date Generated:** October 24, 2017

**ENERGY STAR® Score <sup>1</sup>**

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		
<b>Property Address</b> Livingston Town Hall 357 South Livingston Ave Livingston, New Jersey 07039	<b>Property Owner</b> _____ ( ) - _____	<b>Primary Contact</b> Russel Jones 357 S Livingston Ave Livingston, NJ 07039 9739925000 x5306 ibadilla@trcsolutions.com
<b>Property ID:</b> 6084509		

Energy Consumption and Energy Use Intensity (EUI)			
<b>Site EUI</b> 105.6 kBtu/ft²	<b>Annual Energy by Fuel</b>		<b>National Median Comparison</b>
	Natural Gas (kBtu)	3,426,494 (37%)	National Median Site EUI (kBtu/ft²) 52.1
	Electric - Grid (kBtu)	5,799,082 (63%)	National Median Source EUI (kBtu/ft²) 123.1
			% Diff from National Median Source EUI 103%
<b>Source EUI</b> 249.6 kBtu/ft²			<b>Annual Emissions</b> Greenhouse Gas Emissions (Metric Tons CO2e/year) 825

### Signature & Stamp of Verifying Professional

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

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Licensed Professional**

\_\_\_\_\_  
( ) - \_\_\_\_\_  
\_\_\_\_\_



Professional Engineer Stamp  
(if applicable)