EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

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EDISON TOWNSHIP PUBLIC SCHOOLS

Table of Contents

SECTION 1 – PROJECT OVERVIEW 3
SECTION 2 – ENERGY BASELINE 26
SECTION 3 – ENERGY CONSERVATION MEASURES 85
SECTION 4 – FINANCIAL ANALYSIS 236
SECTION 5 – RISK, DESIGN, & COMPLIANCE 240
SECTION 6 – OPERATION & MAINTENANCE 248
SECTION 7 – OPTIONAL ENERGY GUARANTEE 269
APPENDICIES 272

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 1 – PROJECT OVERVIEW

Project Overview

The Energy Savings Plan (ESP) is the core of the Energy Savings Improvement Program (ESIP) process. It describes the Edison Twp BOE's preferred Energy Conservation Measures (ECMs), the budget cost for each ECM and the ECM energy savings calculations that self-fund the project via reduced operating costs. The ESP provides the Edison Twp BOE the necessary information to decide which proposed ECMs to implement as part of your (ESIP) project. Working with the School District's staff, your selected ESIP project would:

1. Self-fund a $26,434,958 project
2. Generate $1,662,161 in annual energy savings – 56% of current utility spend.
3. Eligible for $564,657 in rebates and incentives – 80% ($325,747) has been applied to project financing.
4. Reduce utility related annual CO2 emissions by 6,158 metric tons – a 70% reduction

NOTE: This submitted ESP doesn't constitute any contractual obligation between the Edison Twp BOE and DCO Energy (DCO). Any contractual obligations will be performed under separate legal documents per mutual signed agreement of the parties involved and subject to the applicable laws and requirements of the ESIP legislation and State of New Jersey.

To ensure conformance with the requirements of Public Finance Notice LFN 2009-11, the ESP must address the following elements:

- *The results of the local government energy audit (APPENDIX H)*
- *A description of the energy conservation measures that will comprise the program; (Section 3)*
- *An estimate of greenhouse gas reductions resulting from those energy savings; (Section 3)*
- *Identification of all design and compliance issues and identification of who will provide these services; (Section 5)*
- *An assessment of risks involved in the successful implementation of the plan; (Section 5)*
- *Identify the eligibility for, and costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities; (Section 3)*
- *Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings; (Section 3)*
- *Maintenance requirements necessary to ensure continued energy savings, and describe how they will be provided; and (Section 6)*

- *If developed by an ESCO, a description of, and cost estimates of a proposed energy savings guarantee. (Section 7)*

In addition, and per LFN 2009-11, the ESP requires several other important elements:

- *The calculations of energy savings must be made in accordance with protocols for their calculation adopted by the BPU. The calculation shall include all applicable State and federal rebates and tax credits, but shall not include the cost of an energy audit and the cost of verifying energy savings. (Section 3)*
- *An independent third party must review the plan and certify that the plan savings were properly calculated pursuant to the BPU protocols.*
- *If an ESCO is used to prepare the plan, the ESCO must provide an estimate of the cost of a guarantee of energy savings. When adopting the plan, the local unit must decide whether or not to accept the guarantee (covered below). (Section 7)*
- *The plan must be verified by an independent third party to ensure that the calculations were made in accordance with the BPU standards and that all required elements of the ESP are covered.*
- *After verification is completed, the governing body must formally adopt the plan. At that point, the plan must be submitted to the Board of Public Utilities where it will be posted on the BPU website. BPU approval is not required. If the contracting unit maintains its own website, the plan must also be posted on that site.*

DCO Energy looks forward to the third-party review of our energy calculations and Edison Twp BOE's approval of the Energy Savings Plan to implement via the requirements of the ESIP legislation. Your time, effort, and support are appreciated.

Edison High School

Edison High School is a two-story, 250,000 square foot building built in 1956. The building is fully heated and partially cooled. Spaces include classrooms, offices, gymnasium, locker rooms, auditorium, cafeteria, library, corridors, stairwells, hallways dance studio, commercial kitchen, and basement mechanical space. The facility is usually occupied from September through June. Typical weekday occupancy is 232 staff and 2,028 students. Occupied hours are 6:00AM to 11:30PM on weekdays, 6:30AM-3:00PM on Saturdays, and 12:00PM to 10:00PM on Sundays. Over the summer, the school stays open for custodian maintenance.

Description of Building HVAC

Unit ventilators (UV) provide heating and ventilation, mainly to classroom areas. They are equipped with supply fan motors, steam or hot water coils, and outside air dampers. Most of the building is served by heating ventilation (HV) units. They are equipped with outside air dampers and supply fan motors of varying horsepower. Edison High School is served by multiple packaged roof top units that provide DX cooling to the building. These units vary in cooling capacity and efficiency. Some of the units, including the Science Wing boxcar unit, are equipped with gas furnace heating. Various areas are cooled with split system air conditioning (AC) units. These vary in capacity between 1-ton and 20-tons. There are also split system heat pump units that also provide electric heating. They range in cooling capacity from 20MBh to 34 MBh.

Two Easco 8,369 MBh steam boilers serve most of the building heating requirements.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T-12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. LED sources provide illumination in areas including main offices, hallways and restrooms including new fixtures and replacement linear tubes. Almost all exit signs are LED. Gymnasium fixtures have high bay LED lamps. Auditorium fixtures are equipped with 4-lamp, 2-foot T8 fixtures.

J.P. Stevens High School

J.P. Stevens High School is a two-story, 220,500 square foot building built in 1962. Spaces include classrooms, two gymnasium, locker rooms and restrooms, storage areas, auditorium, offices, cafeteria, fitness center, art room, dance room, home economics room, corridors, stairwells, library, shops, counselor offices, nurse office, commercial kitchen, and boiler room. The facility is occupied year-round, and school operates from September through June during the year. Occupied hours are 6:00AM to 11:00PM on weekdays, 6:00AM to 8:00PM on weekends. Typical weekday occupancy is 245 staff and 2,517 students.

Description of Building HVAC

Unit ventilators are equipped with hot water coils and served by various boilers, providing heating only through a two-pipe hydronic system. Most of the building is served by heating ventilation (HV) units. These units are tied to the boiler loop and supply ventilation to their respective areas. The vice principal's offices, nurse's office, and main office area are served by packaged terminal heat pump (PTHP) units. Various areas are served by packaged roof top units (RTUs). There are four gas-fired furnaces. Various areas are cooled with split system air conditioning (AC) units and heat pumps. Classrooms are cooled by window air conditioning (AC) units. Three trailers outside the school building are served by a total of three wall mounted packaged air conditioning units equipped with electric heating. The greenhouse is served by an electric heater.

One 6695 MBh Easco hot water boiler (Boiler 1) from 2012 and two older 8367.75 MBh Cleaver Brooks boilers (Boilers 2 and 3) serve the building's heating load needs.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T-12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Gymnasium B fixtures have high bay 400-Watt mercury vapor and 120-Watt LED lamps that are manually controlled. Gymnasium A and the auditorium have ambient 40-Watt LED fixtures. Fitness center fixtures have high bay 160-Watt LED lamps. Dance studio has 28-Watt recessed LED linear strips. The kitchen snack serving area has ambient 40-Watt LED fixtures. All exit signs are LED units.

Herbert Hoover Middle School

Herbert Hoover Middle School is a two-story, 133,000 square foot building built in 1967. Spaces include classrooms, offices, gymnasium, cafeteria, kitchen, library, copy rooms, lounges, lobbies, corridors, stairwells, hallways, rest rooms, locker rooms, closets, storage spaces, and mechanical spaces. The facility is occupied year-round. Typical weekday occupancy is 116 staff and 961 students. Occupied hours are 6:00 AM to 11:30 PM on weekdays, 8:00 AM to 3:00 PM on the weekends.

Description of Building HVAC

Unit ventilators serve classroom areas for heating and ventilation. There was also an electric resistance heater found in the building. The main office is served by a packaged roof top unit (RTU). There is one 20-ton, 8.35 EER, Lennox unit equipped with direct expansion (DX) coils and no gas-fired heating section. There are six heating and ventilation air handling units (AHUs) throughout the building. These units are equipped with hot water coils served by the boiler. Classrooms are cooled by window air conditioning (AC) units. There are three split system ACs located on the roof and serving various offices in the building. Two of these units are 4.0-ton York units with 8.90 EERs. The third unit is a 5.0-ton Trane unit with a 10.95 EER. There is also one EMI ductless mini-split system AC found on the ground level outside of the building. Based on size and function, it is estimated to be a 3.0-ton unit

Two non-condensing hot water boilers serve the building heating load. One is a 6,695-MBh Cleaver Brooks boiler, built in 1966. The other is a 5,858-MBh Easco boiler, built in 2018. The burners are fully modulating. The older boiler is equipped with a 10 hp combustion air fan and the newer boiler has a 7.5 hp combustion air fan. The boilers are configured in a lead-lag control scheme. Only one boiler is required under high load conditions.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T-12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Gymnasium fixtures have high bay LED lamps and are manually controlled. All exit signs are LED.

John Adams Middle School

John Adams Middle School is a two-story, 103,000 square foot building built in 1960. Spaces include classrooms, offices, gymnasium, cafeteria, kitchen, library, conference rooms, locker rooms, rest rooms, closets, storage rooms, corridors, stairwells, mechanical spaces, and two trailers. The facility is occupied from September through June, with occupied hours from 6:00 AM to 11:30 PM during the week, and 8:00 AM to 6:00 PM on Saturday. Typical weekday occupancy is 94 staff and 961 students.

Description of Building HVAC

Unit ventilators have 1/6 hp supply fan motors and pneumatically controlled outside air dampers. A 2.0 hp air compressor located in the boiler room serves the pneumatic system. There were several heating and ventilation units found throughout the building that have hot water coils served by the boilers. The main office area is served by a fan coil unit equipped with hot water coils and direct expansion (DX) coils. The DX coils are cooled by a 7.5-ton York split system air conditioner (AC) with a 9.3 energy efficiency ratio (EER), while the hot water coils are served by the boilers. This system has a 1.5 hp supply. There are two Bard units serving the trailers next to the main building. Both units are assumed to be packaged ACs with DX coils and electric resistance heating. Several areas of the building use window air conditioning (AC) units. There is a total of 12.

Two Easco 5,021-MBh hot water non-condensing boilers serve the building heating load.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T-12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent, U-bend fluorescent T8, halogen incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. There is also a metal halide fixture found in Stairwell, 2. Gymnasium fixtures have high bay LED lamps and are manually controlled. All exit signs are LED.

Thomas Jefferson Middle School

Thomas Jefferson Middle School is a two-story, 80,500 square foot building built in 1959. Spaces include: classrooms, offices, gymnasium, cafeteria, kitchen, library, storage rooms, closets, rest rooms, locker rooms, copy rooms, conference rooms, faculty lounges, corridors, stairwells, and mechanical spaces. The facility is occupied year-round. Typical weekday occupancy is 98 staff and 796 students. Typical weekday school hours are from 8:00 AM to 3:00 PM, with after school activities running until 9:00 PM. The building is open on Saturday for recreational purposes from 7:30 AM to 5:30 PM.

Description of Building HVAC

Unit ventilators (UV) supply heating and ventilation, mainly to classroom and office areas. These unit ventilators are equipped with hot water coils that are served by the boilers and pneumatic dampers that allow for outside air ventilation. They have 1/8 hp supply fan motors to condition the space. A two motor, 2.0 hp air compressor located in the boiler room serves the pneumatic system. The gymnasium's heating load is served by two heating and ventilation air handling units (AHUs). These units are equipped with hot water coils and bring in outside air for ventilation in the space. These units are also equipped with constant speed 1.0 hp supply fans. Classrooms, offices, and the library are cooled by window air conditioning (AC) units. These vary in capacity between 0.67 tons and 2.38 tons. The units are mostly in fair condition, with some units in poor condition. They range in efficiency between 8.50 EER to 10.70 EER.

Two Easco 5,021 MBh non-condensing hot water boilers serve the building heating load.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also few 40-Watt, 8-foot T12 fixtures in the stairs. Additionally, there are some U-bend fluorescent T8 lamps, compact fluorescent lamps (CFL), high intensity discharge (HID), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Gymnasium fixtures have high bay LED lamps and are manually controlled. All exit signs are LED.

Woodrow Wilson Middle School

Woodrow Wilson Middle School is a two-story, 103,000 square foot building built in 1973. The building is fully heated and partially cooled. Spaces include classrooms, gymnasium, cafeteria, corridors, locker rooms, offices, commercial kitchen, and mechanical space. The facility is occupied September through June with a typical weekday occupancy of 112 staff and 1,271 students. Occupied hours are 6:00AM to 11:30PM on weekdays, 6:00AM to 3:00PM on Saturdays, and 10:00AM to 6:00PM on Sundays.

Description of Building HVAC

There are two different kinds of unit ventilators (UV) found on site. Each Nesbitt UV is equipped with a 1/6 hp supply fan motor while each AAF UV is equipped with a ¼ hp supply fan motor. Both systems supply ventilation and heating to their respective zones. The main offices are served with packaged terminal heat pump (PTHP) units controlled manually. These 10.1 EER units have a heating capacity of 11.60 MBh and 1-ton cooling capacity. The library is served by a packaged roof top unit (RTU). It is a Lennox unit with a 25-ton cooling capacity and an estimated EER of 9.0. The unit is equipped with an economizer and controlled through a thermostat. Classrooms throughout the building are equipped with split system and window air conditioning (AC) units. These vary in cooling capacity between 1 ton and 3.5 tons. The units vary in condition and have a typical efficiency of 10 EER.

Two Easco 5,021 MBh hot water boilers serve the building heating.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures located in the mezzanine area of the building. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. These fixtures vary in wattages and efficiency. The cafeteria and gymnasium are equipped with 2-lamp, 2-foot T8 fixtures as well as 2-foot by 2-foot ambient LED fixtures. The facility is in process of upgrading the old T8 fixtures to LED sources. All exit signs are LED. Exterior fixtures include wall packs, downlight recessed lights, and ceiling mounted lights. Most of these fixtures are HID fixtures, but some are LED wall packs located throughout the facility. Pole mounted fixtures are equipped with LED lighting, estimated at 45-Watts per fixture.

Benjamin Franklin Elementary School

Benjamin Franklin School is a one-story, 53,000 square foot building built in 1960, with the last renovation taking place in 2003. Spaces include: classrooms, gymnasium, offices, library, garage, kitchen, storage rooms, rest rooms, faculty rooms, hallways, trash rooms, closets, lobbies, and mechanical spaces. The facility is occupied from September through June. Typical weekday occupancy is 70 staff and 600 students. The typical weekday school hours are from 8:00 AM to 3:45 PM, while maintenance activities are from 6:30 AM to 11:30 AM.

Description of Building HVAC

Unit ventilators have supply fan motors and pneumatically controlled outside air dampers and fan coil valves. There are unit ventilators that supply heat to each classroom, each with one 1/8 HP supply fan motor. This system appears to be in fair operating condition. Some rest rooms and hallways also have cabinet unit heaters equipped with hot water coils. There is also a Nesbitt fan coil unit located in and serving the boiler room, with an estimated ¼ HP supply fan motor. Some classrooms and offices are cooled by window air conditioning (AC) units. There are 22 total units, varying in capacity between 1.0-ton and 2.0-tons. They range in efficiency between 8.35 EER to 10.40 EER.

Two Smith Cast Iron 3,040-MBh non-condensing hot water boilers serve the building heating load. These units are equipped with Power Flame Burner combustion air fans rated at 1.5 HP each.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear and U-bend fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Gymnasium fixtures have CFL Biax lamps with parabolic reflectors and are manually controlled. All exit signs are LED.

James Madison Intermediate School

JMIS is a 44,000 square foot building built in 1959. Spaces in the school include classrooms, multi-purpose rooms, restrooms, storage rooms, hallways, offices, and mechanical space. Three additional trailers are heated and cooled using outdoor packaged units. The facility is occupied from September through June. Typical weekday occupancy at JMIS is 76 full time staff and 669 students. Typical class hours are from 9:00 AM to 3:30 PM. At JMIS the custodial hours are from 6:00 AM to 6:30 PM. The site has no weekend or summer activities.

Description of Building HVAC

JMIS has 33-unit ventilators with hot water coils and supply fan motors. The unit ventilators are pneumatically controlled by outside air dampers and fan coil valves. At JMIS, the trailers have packaged Bard AC units, each with a 3-ton cooling capacity and 15 MBh heating capacity of resistance heat. Temperatures are controlled using programmable thermostats in the trailers. Various classrooms and offices at JMIS are cooled using window AC units with cooling capacities ranging between 1 ton to 1.5 tons. The EER values of these units ranges between 9 and 11. 2.

Heating at the JMIS is provided using two gas-fired, non-condensing hot water Easco boilers, each with an output capacity of 2678 MBh. The boilers have an efficiency of 82%. Hot water produced by the boilers is circulated to the unit ventilators through three 3 hp constant speed hot water pumps.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Spaces including the restrooms, hallway areas, offices, and the library are lit using 36-Watt or 46-Watt LED fixtures and 15-Watt LED linear tubes. Additionally, there are some 26-Watt compact fluorescent lamps (CFL), 60-Watt incandescent, and 10-Watt LED general purpose lamps. Exterior lighting in the facility is provided by 26-Watt and 32-Watt CFLs, 70-Watt metal halide fixtures and 30-Watt LED fixtures. All exit signs are 2-Watt LED units.

Franklin D. Roosevelt Round Building

FDRS is a 14,750 square foot building built in 1968. Spaces include classrooms, offices, rest rooms, multipurpose room, closets, break room, hallways, and mechanical rooms. An addition was completed in September 2019. The facility is occupied from September through June. Typical weekday occupancy at FDRS is 41 full-time staff and 113 students. At FDRS the custodial hours are from 6:30 AM to 11:30 PM. The site has no weekend or summer activities.

Description of Building HVAC

The heating load at FDRS is met by 15 electric resistance heaters. Twelve of these units serve building classrooms while the other three serve the multi-purpose room. Two of the units in the multi-purpose room are no longer operational. The information about each unit has been estimated to have a heating capacity of 24.0-MBh. There are also four 1.1-MBh and one 8.53-MBh electric resistance heaters serving other areas of the building. Serving the heating and cooling requirements of the FDRS break room is a Trane through-the-wall heat pump. Information about this unit has been estimated due to lack of nameplate, Based on the size, and area served. This unit has an estimated 1.13-ton cooling capacity and 12.20 MBh heating capacity. A total of 12 window air conditioning units serve the cooling requirements of the FDRS classrooms. These units vary in cooling capacity from 1.0-ton to 1.58-tons. There is also a 1.0-ton, 10.6 EER window AC serving an office in the FDRS building.

Description of Building Lighting

The primary interior lighting system uses a mixture of 15-Watt LED lamps and 2-foot, 17-Watt linear fluorescent T8 lamps. Additionally, there are some LED general purpose lamps, and U-bend fluorescent T8 lamps. Fixture types include 2-lamp or 3-lamp, 2-foot or 4-foot ceiling mounted, recessed, and troffer fixtures, as well as 2-foot U-bend fixtures. Multi-purpose room fixtures use high bay LED lamps. Exterior fixtures at FDRS include under canopy mounted and wall pack fixtures with LED and incandescent lamps. Exterior fixtures are controlled by a timeclock. It was noted that the timeclock is set to operate lamps for more than 12 hours per day.

James Madison Primary School

James Madison Primary School is a one-story, 46,000 square foot building built in 1971. Spaces include classrooms, gymnasium, auditorium, offices, corridors, stairwells, ballrooms, commercial kitchen, and storage space. The facility is occupied year-round, from September through June. Typical weekday occupancy is 67 staff and 521 students. Occupied hours are 9:00AM to 3:30PM on weekdays. There are no weekend activities.

Description of Building HVAC

The first floor of the building is served by three Bryant air handling units equipped with an outdoor condensing unit and a gas furnace. Each unit has 4-ton cooling capacity and 74-MBh heating capacity, installed in 2006.

The top two floors are served by packaged roof top units (RTU's). The second floor is served with a Trane unit with a 5-ton cooling capacity and a gas furnace of 104 MBh capacity, and a York 12.50-ton unit equipped with 198 MBh capacity furnace. These units were installed in 2013 and 2001, respectively. The third floor is served by a Trane unit with 8.50-ton cooling capacity equipped with a 160 MBh capacity furnace. The server room is equipped with a 1-ton Mitsubishi split system air conditioning unit.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures located in the mezzanine area of the building. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. These fixtures vary in wattages and efficiency. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long troffer and recessed fixtures, and 4-foot fixtures with U-bend tube lamps. Most fixtures are in fair condition. Gymnasium fixtures have linear T5 fluorescent lamps and are manually controlled. Stage fixtures have incandescent and linear fluorescent lamps. All exit signs are LEDs.

James Monroe Elementary School

James Monroe School is a two-story, 68,000 square foot building built in 2016. Spaces include classrooms, gymnasium, stage, offices, cafeteria, corridors, stairwells, commercial kitchen, and mechanical spaces. The facility is occupied year-round, from September through June. Typical weekday occupancy is 83 staff and 520 students. Occupied hours are from 6:00AM to 11:30PM on weekdays. Summer occupancy includes a summer school that operates from 9 am to 12 pm, and continuing maintenance activities. There are no weekend activities.

Description of Building HVAC

The school is served by multiple packaged roof top units, each with a DX coil and gas fired heater. The gym, cafeteria, and library are each served by a dedicated RTU. The tech closet uses a split-system (AC) unit. The 2-ton unit is in good condition and rated at 10.3 EER.

Two ERCO 712.5 MBh condensing hot water boilers serve the building heating load. The burners are fully modulating with a nominal efficiency of 95%.

Description of Building Lighting

The primary interior lighting system uses linear LED tubes and LED ambient fixtures. Additionally, there are also downlight recessed fixtures and dome fixtures. Gymnasium fixtures have high bay LED lamps and are controlled by occupancy sensors. All exit signs are LEDs. Exterior fixtured primarily include wall packs and downlights in exterior walkways, all with LED lamps. Pole-mounted fixtured are high intensity discharge (HID) high-pressure sodium (HPS) lamps.

John Marshall Elementary School

John Marshall School is a one-story, 62,500 square foot building built in 1961. Spaces include classrooms, gymnasium, offices, cafeteria, nurse office, library, restrooms, faculty lounge, corridors, stairwells, courtyard, storage areas, commercial kitchen, and lower level mechanical space. The facility is occupied year-round however school operates from September through June in a year with afterschool activities. Typical weekday occupancy is 105 staff and 833 students. Summer occupancy includes a summer school program and continuing cleaning and maintenance activities. There are no weekend activities. Occupied hours are 6:00AM to 11:30PM on weekdays.

Description of Building HVAC

Unit ventilators (UV) are equipped with hot water coils and served by various boilers, providing heating and ventilation through a two-pipe hydronic system. UVs have 1/8 hp supply fan motors and fan coil valves. Library is served with a heating and ventilation (HV) unit equipped with a 2 hp fan. The four outdoor trailers are each conditioned by one wall mounted packaged air conditioning unit equipped with electric heating. Three roof mounted gas-fired burners provide supplemental heating for the gym. Classrooms and the principal's office are cooled by window air conditioning (AC) units. for the facility manager's office, faculty lounge, and some of the classrooms is provided by split system air conditioning (SAC) units. These vary in capacity between 0.75 tons and 3 tons. A 1.5 hp air compressor located in the boiler room serves the pneumatic system. The old boiler room contains two 1659 MBh non-condensing hot water boilers with seven modules serving the heating requirements of the original building. One 1426.50 MBh condensing and one 1320 MBh non-condensing hot water boiler located in the new boiler room meet the heating needs of the classroom wings.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures. Additionally, there are some compact fluorescent lamps (CFL), halogen incandescent and LED general purpose lamps. Gymnasium fixtures have 400-Watt high bay metal halide lamps. Library fixtures have 4-foot linear fluorescent lamps. All exit signs are LED units.

Lincoln Elementary School

Lincoln School is a one-story, 55,000 square foot building built in 1951. Spaces include classrooms, gymnasium, offices, corridors, offices, commercial kitchen, storage areas, and mechanical space. The facility is occupied year-round, from September through June. Typical weekday occupancy is 94 staff and 906 students. Occupied hours are 6:00AM to 3:00PM on the weekdays. There is no activity on the weekends or over the summer.

Description of Building HVAC

Trailers 1 and 2 each are served with two Bard vertical packaged terminal heat pumps (PTHP). Classrooms are cooled by window air conditioning (AC) units with on-board controls on the unit. These 1-ton units are rated at 10.8 EER.

The school building is served by three boilers. One Cleaver 2,415 MBh steam boiler, located in Boiler Room 1, serves the heating load for C wing. The rest of the building is served by two 2,452 Mbh Well-McLain steam boilers located in Boiler Room 2. Room 24 is heated with a 24 Mbh gas-fired, warm air heater unit. The vestibule is heated using two electrical resistance heating units.

Description of Building Lighting

The primary interior lighting system for the main school and trailers uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Gymnasium fixtures have high-bay ceiling mount LED lamps. All exit signs are LEDs. Exterior fixtures include wall packs with incandescent lamps and high intensity discharge (HID) lamps.

Lindeneau Elementary School

Lindeneau School is a one-story, 43,000 square foot building built in 1966. Spaces include classrooms, multipurpose room, offices, storage and janitorial closets, restrooms, cafeteria, corridors, commercial kitchen, and mechanical space. The facility is occupied year-round, from September through June. Typical weekday occupancy is 60 staff and 446 students. Occupied hours are 6:00AM to 11:30PM on weekdays. No activity on the weekends.

Description of Building HVAC

There are 33-unit ventilators (UV) with hot waters coil providing heating in the classrooms and a few other spaces. Several classrooms and some offices are cooled using window AC units. The capacities of these units range from 8,000 Btuh to 12,000 Btuh.

Each of the wings have two gas-fired, non-condensing hot water boilers. Two RBI boilers with an output capacity of 425 MBh each, serve the upper wing. Two Burnham boilers serve the lower wing boilers with an output capacity of 1580 MBh each.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps and 15-Watt LED linear tubes. There are several 9-Watt LED general purpose lamps in restrooms and storage spaces. Exterior lighting is provided by 20-Watt LED wall pack fixtures, 50-Watt and 70-Watt metal halide wall pack fixtures, and 25-Watt downlight recessed fixtures with LED lamps.

Martin Luther King Elementary School

Martin Luther King School is a one-story, 54,000 square foot building built in 1970. Spaces include classrooms, gymnasium, auditorium, offices, corridors, storage spaces. The facility is occupied year-round, from September through June. Typical weekday occupancy is 82 staff and 687 students. Summer occupancy includes a summer day camp and continuing maintenance activities. There are no weekend activities. Occupied hours are 7:00AM to 6:00PM on weekdays.

Description of Building HVAC

Unit ventilators serve classrooms and offices for heating with hot water delivered by heating hot water pumps 1, 2, 3, and 4. The classrooms use window air conditioning (AC) units. There are 11 units at the site which vary in capacity between 1 ton and 2 tons. The faculty lounge and office spaces are served with split-system air conditioning (AC) units.

Two HB Smith 2,776 MBh hot water boilers serve the building heating load.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Exterior fixtures include wall packs and flood lights with high intensity discharge (HID) and LED lamps. The pole mounted flood fixtures also include a mix of HID and LED lamps.

Washington Elementary School

Washington School is a one-story, 56,500 square foot building built in 1952, with the latest renovation being in 2003. Spaces include: classrooms, offices, copy rooms, rest rooms, gymnasium, library, cafeteria, kitchen, faculty lounges, hallways, storage areas, closets, mechanical spaces, boiler rooms, lobbies, and vestibules. The facility is occupied year-round, with reduced occupancy in the summer months. Typical weekday occupancy is 94 staff and 588 students. Occupied hours are 6:00 AM to 11:30 PM during the school year, 6:00AM to 4:00PM in the summer. There are no weekend activities.

Description of Building HVAC

Most classrooms have steam unit ventilators served by the boilers to support the building's heating load. Two electric resistance heaters were found in the building as well, one located in the copy room and one in a rest room. There are two Trane packaged roof top units (RTUs) serving the K-wing. These units are referred to as RTU-1 and RTU-2, both equipped with Direct Expansion (DX) coils and gas-fired furnaces. There are also 13 Nesbitt Aire packaged terminal heat pumps throughout the building, located in classrooms, faculty lounge, and child study room. Some classrooms are cooled by window air conditioning (AC) units. Eight Electrolux Home Products units each have a 2.0-ton cooling capacity. There are also two ductless mini-split system ACs serving the assistant principal's office and the guidance office.

Two Wein-McLain 3,550-MBh forced draft steam boilers serve the building heating load.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear and U-bend fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Gymnasium fixtures have LED fixtures. The library incorporates LED tube lamps. All exit signs are LEDs. Exterior fixtures include wall packs, down lights, pole-mounted fixtures, arm-mounted fixtures, and under canopy fixtures with high intensity discharge (HID), incandescent, and LED lamps.

Woodbrook Elementary School

Woodbrook School is a one-story, 86,000 square foot building built in 1965. Spaces include classrooms, offices, gymnasium, cafeteria, kitchen, library, lobbies, courtyard, rest rooms, hallways, storage rooms, closets, and mechanical spaces. The facility is occupied year-round. Typical weekday occupancy is 97 staff and 978 students. Occupied hours are 6:00 AM to 11:30 PM during the week, 6:00 AM to 4:30 PM in the summer. There are no weekend activities.

Description of Building HVAC

Unit ventilators are equipped with hot water coils and served by various boilers, providing heating only through a two-pipe hydronic system. There are also cabinet unit heaters in the hallways and several fin tube radiators throughout the building. Several areas in the building are served by packaged roof top units (RTUs). There are five packaged AC units with direct expansion (DX) coils and gas-fired furnaces. There is also a packaged terminal AC in the art room, which is equipped with hot water coils served by the boilers, and DX coils. Classrooms and offices are cooled using window air conditioning (AC) units. A Carrier split-system AC serves room 112A. There are also three ductless mini-split system heat pumps serving board room 128, classroom 145, and the guidance office.

There is a total of 5 hot water boilers throughout the building. All of the boilers are non-condensing hot water boilers, except the Aerco boiler, which is a condensing hot water boiler located in the new boiler room, serving the new wing.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear and U-bend fluorescent T8 lamps. There are also some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Gymnasium fixtures have high bay LED T5HO lamps. All exit signs are LED. Exterior fixtures include wall packs, spotlights, pole-mounted fixtures, downlight fixtures, and under canopy lights with LED, high-pressure sodium, and metal halide lamps.

Edison Early Learning Center

Edison Early Learning Center is a one-story, 7,300 square foot building built in 2004. Spaces include: classrooms, offices, rest rooms, hallways, lobbies, and mechanical space. The facility is occupied from September through June. Typical weekday occupancy is 21 full-time staff. According to facility personnel, the site is occupied from 6:00 AM to 11:30 AM. Summer occupancy includes continuing maintenance activities. There are no weekend activities.

Description of Building HVAC

There are seven, one-unit ventilators per classroom. Each have an estimated ¼ HP supply fan motor. The hallways and offices are served by a Trane packaged roof top unit (RTU). This unit is equipped with a Direct Expansion (DX) coil and a gas-fired furnace. The classrooms in the building each have a split-system air conditioning (AC) unit that serve the seven unit ventilators.

Two Slant Fin 240.0-MBh non-condensing hot water boilers serve the building heating load.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. All exit signs are LED. Exterior fixtures include wall packs and under canopy lights with LED lamps, high intensity discharge (HID) lamps, and linear fluorescent T8 lamps.

Edison Education Center (Administration Building)

Edison Education Center is a one-story, 30,000 square foot building built in 1962. Spaces include: warehouse, welding shop, kitchen, hallways, copy rooms, storage rooms, offices, reception areas, restrooms, vestibules, mechanical rooms, electrical rooms, caucus room, and break rooms. The facility is occupied year-round, with reduced hours in the summer months. Typical weekday occupancy is 147 staff. The building is occupied from 7:00 AM to 11:00 PM during the year, and 7:00 AM to 6:00 PM during the summer months. There are no weekend activities.

Description of Building HVAC

The building heating and cooling loads are mainly served by packaged roof top units (RTUs). There are 14 units that have Direct Expansion (DX) coils ranging in size from 2.0-tons to 10.0-tons and equipped with gas-fired furnaces. Two Mitsubishi ductless mini-split heat pumps and one Liebert split-system air conditioning unit condition the server room. One ductless mini-split air conditioner serves Room 70. The other piece of equipment is a split-system air conditioner. There is also a gas-fired Modine warm air unit heater located in the warehouse area.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear and U-bend fluorescent T8 lamps. Additionally, there are some incandescent lamps and 40-Watt linear fluorescent T12 lamps. All exit signs are LED. Exterior fixtures include sign lights, wall packs, flood lights, pole-mounted fixtures, and arm-mounted fixtures with high intensity discharge (HID), LED, and linear fluorescent T12 lamps.

Buildings and Grounds

The Buildings and Grounds Shed is a combined 12,000 square foot building built in 1999. It was renovated in 2005. Spaces include: two warehouses, offices, garage, rest rooms, hallways, break room, mezzanine, and equipment maintenance and storage areas. The facility has varying occupancy depending on the weather conditions. This site is typically occupied year-round from 6:00 AM to 3:00 PM during the week. The staff occupancy varies. Summer and weekend occupancy also vary depending on the weather conditions in the area.

Description of Building HVAC

There is a total of nine infrared unit heaters, three of which are in the warehouse, three in the garage, and three in the grounds area. A packaged heating, cooling, and ventilating unit located on the mezzanine serves the office and rest room spaces. The unit is also equipped with Direct Expansion (DX) coils served by an outdoor condensing unit.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 40-Watt T12 fixtures, mercury vapor fixtures, and LED linear tube lamps. The warehouse has high bay high intensity discharge (HID) fixtures with prismatic reflectors and surface mounted fixtures with linear fluorescent T8 lamps. All exit signs are LED. Exterior fixtures include wall packs with HID and LED lamps.

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 2 – ENERGY BASELINE

Total Utility Consumption and Site EUI

The Edison School District Energy Savings Plan includes 20 buildings: 2 high schools, 5 middle schools, 9 elementary schools, 2 preschools, 1 administration building, and 1 warehouse. To develop the ESP, DCO Energy was provided with all available utility data (electric, natural gas, fuel oil). DCO Energy tracked and documented this utility data from March 2022 to February 2023. A listing of the buildings, the total utility consumption, and Energy Usage Index for the 20 sites are detailed below.

BUILDINGS & FACILITIES		
BUILDING #	BUILDING/FACILITY NAME	SQFT
1	**Edison High School**	**250,499**
2	**John P. Stevens High School**	**220,287**
3	**Herbert Hoover Middle School**	**132,625**
4	**John Adams Middle School**	**93,041**
5	**Thomas Jefferson Middle School**	**90,514**
6	**Woodrow Wilson Middle School**	**102,122**
7	**Benjamin Franklin Elementary School**	**56,975**
8	**James Madison Intermediate School**	**44,000**
9	**James Madison Primary School**	**46,000**
10	**James Monroe Elementary School**	**67,800**
11	**John Marshall Elementary School**	**62,517**
12	**Lincoln Elementary School**	**55,315**
13	**Lindeneau Elementary School**	**45,503**
14	**Martin Luther King Elementary School**	**54,136**
15	**Washington Elementary School**	**56,410**
16	**Woodbrook Elementary School**	**85,954**
17	**FDR Round Building**	**14,750**
18	**Edison Early Learning Center**	**7,297**
19	**Edison Education Center**	**30,000**
20	**Building and Grounds**	**12,000**

Edison TWP BOE - Energy Use Summary

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		ELECTRIC				
BUILDING/FACILITY NAME	SQFT	USAGE kWh	DEMAND kW	USAGE BTU / SQFT	TOTAL COST $$	BLENDED COST $$ / kWh
Edison High School	250,499	1,500,367	507	20,436	$326,170	$0.217
John P. Stevens High School	220,287	1,934,894	670	29,969	$398,389	$0.206
Herbert Hoover Middle School	132,625	591,822	200	15,226	$95,129	$0.161
John Adams Middle School	93,041	447,639	157	16,416	$66,204	$0.148
Thomas Jefferson Middle School	90,514	383,398	148	14,453	$52,267	$0.136
Woodrow Wilson Middle School	102,122	583,422	242	19,493	$69,977	$0.120
Benjamin Franklin Elementary School	56,975	239,755	171	14,358	$35,521	$0.148
James Madison Intermediate School	44,000	504,182	192	39,097	$76,844	$0.152
James Madison Primary School	46,000	307,650	108	22,820	$54,361	$0.177
James Monroe Elementary School	67,800	490,202	229	24,669	$71,801	$0.146
John Marshall Elementary School	62,517	424,067	137	23,144	$93,532	$0.221
Lincoln Elementary School	55,315	318,050	117	19,618	$50,764	$0.160
Lindeneau Elementary School	45,503	173,480	164	13,008	$33,825	$0.195
Martin Luther King Elementary School	54,136	294,525	127	18,563	$56,412	$0.192
Washington Elementary School	56,410	363,040	214	21,959	$62,499	$0.172
Woodbrook Elementary School	85,954	576,697	242	22,892	$97,678	$0.169
FDR Round Building	14,750	121,640	125	28,138	$13,561	$0.111
Edison Early Learning Center	7,297	82,745	61	38,691	$15,288	$0.185
Edison Education Center	30,000	274,000	106	31,163	$41,526	$0.152
Building and Grounds	12,000	54,053	18	15,369	$8,043	$0.149
TOTALS	**1,527,745**	**9,665,628**	**3,936**	**21,587**	**$1,719,794**	**$0.178**

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		NATURAL GAS			
BUILDING/FACILITY NAME	SQFT	USAGE THERMS	USAGE BTU / SQFT	TOTAL COST $$	BLENDED COST $$ / THERM
Edison High School	250,499	133,394	53,251	$140,327	$1.052
John P. Stevens High School	220,287	126,549	57,447	$153,182	$1.210
Herbert Hoover Middle School	132,625	49,496	37,320	$65,801	$1.329
John Adams Middle School	93,041	49,164	52,841	$61,009	$1.241
Thomas Jefferson Middle School	90,514	47,097	52,033	$52,092	$1.106
Woodrow Wilson Middle School	102,122	32,474	31,799	$46,687	$1.438
Benjamin Franklin Elementary School	56,975	23,105	40,553	$25,875	$1.120
James Madison Intermediate School	44,000	18,672	42,437	$24,778	$1.327
James Madison Primary School	46,000	22,167	48,190	$27,869	$1.257
James Monroe Elementary School	67,800	17,040	25,133	$27,625	$1.621
John Marshall Elementary School	62,517	28,121	44,981	$31,856	$1.133
Lincoln Elementary School	55,315	71,219	128,752	$81,136	$1.139
Lindeneau Elementary School	45,503	21,361	46,945	$25,223	$1.181
Martin Luther King Elementary School	54,136	24,829	45,864	$30,140	$1.214
Washington Elementary School	56,410	24,736	43,851	$30,791	$1.245
Woodbrook Elementary School	85,954	39,306	45,730	$72,976	$1.857
FDR Round Building	14,750	0	0	$0	$0.000
Edison Early Learning Center	7,297	4,959	67,957	$5,998	$1.210
Edison Education Center	30,000	6,689	22,298	$10,283	$1.537
Building and Grounds	12,000	11,420	95,163	$12,360	$1.082
TOTALS	**1,527,745**	**751,800**	**49,210**	**$926,010**	**$1.232**

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		Water & Sewer (Gal)			
BUILDING/FACILITY NAME	SQFT	USAGE Water & Sewer (Gal)	USAGE GAL / SQFT	TOTAL COST $$	UNIT COST $$ / Water & Sewer (Gal)
Edison High School	250,499	523,600	2.1	$12,747	$0.0097
John P. Stevens High School	220,287	3,300,176	15.0	$72,761	$0.0184
Herbert Hoover Middle School	132,625	897,600	6.8	$25,059	$0.0171
John Adams Middle School	93,041	538,560	5.8	$19,216	$0.0180
Thomas Jefferson Middle School	90,514	743,512	8.2	$12,393	$0.0097
Woodrow Wilson Middle School	102,122	1,374,096	13.5	$28,116	$0.0179
Benjamin Franklin Elementary School	56,975	506,396	8.9	$8,468	$0.0124
James Madison Intermediate School	44,000	1,215,000	11.6	$31,532	$0.0181
James Madison Primary School	46,000	0	11.6	$0	$0.0181
James Monroe Elementary School	67,800	301,444	4.4	$15,110	$0.0179
John Marshall Elementary School	62,517	483,492	7.7	$8,825	$0.0118
Lincoln Elementary School	55,315	840,752	15.2	$15,998	$0.0165
Lindeneau Elementary School	45,503	261,052	5.7	$5,410	$0.0107
Martin Luther King Elementary School	54,136	336,600	6.2	$8,010	$0.0179
Washington Elementary School	56,410	807,092	14.3	$18,935	$0.0103
Woodbrook Elementary School	85,954	713,592	8.3	$26,847	$0.0187
FDR Round Building	14,750	0	11.6	$0	$0.0181
Edison Early Learning Center	7,297	50,116	6.9	$1,737	$0.0097
Edison Education Center	30,000	216,172	7.2	$10,719	$0.0179
Building and Grounds	12,000	17,204	1.4	$3,481	$0.0179
TOTALS	**1,527,745**	**13,126,456**	**8.6**	**$325,364**	**$0.0161**

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		SITE ENERGY	SOURCE ENERGY	TOTAL COST
BUILDING/FACILITY NAME	SQFT	USAGE BTUs	USAGE BTUs	$$
Edison High School	250,499	18,458,622,904	28,340,245,406	$479,245
John P. Stevens High School	220,287	19,256,785,328	31,772,876,668	$624,332
Herbert Hoover Middle School	132,625	6,968,924,664	10,851,140,059	$185,989
John Adams Middle School	93,041	6,443,764,268	9,438,804,950	$146,429
Thomas Jefferson Middle School	90,514	6,017,827,576	8,607,988,413	$116,752
Woodrow Wilson Middle School	102,122	5,238,018,864	8,983,532,569	$144,780
Benjamin Franklin Elementary School	56,975	3,128,540,260	4,716,544,378	$69,865
James Madison Intermediate School	44,000	3,587,502,984	6,777,348,855	$133,154
James Madison Primary School	46,000	3,266,421,800	5,266,721,040	$82,230
James Monroe Elementary School	67,800	3,376,618,224	6,472,445,277	$114,537
John Marshall Elementary School	62,517	4,259,003,904	7,004,058,156	$134,213
Lincoln Elementary School	55,315	8,207,095,171	10,516,526,479	$147,899
Lindeneau Elementary School	45,503	2,728,035,160	3,900,285,998	$64,458
Martin Luther King Elementary School	54,136	3,487,817,300	5,420,816,940	$94,562
Washington Elementary School	56,410	3,712,336,380	6,065,665,039	$112,225
Woodbrook Elementary School	85,954	5,898,339,364	9,636,714,119	$197,501
FDR Round Building	14,750	415,035,680	1,162,099,904	$13,561
Edison Early Learning Center	7,297	778,207,840	1,311,188,627	$23,024
Edison Education Center	30,000	1,603,821,000	3,320,066,050	$62,528
Building and Grounds	12,000	1,326,382,836	1,715,452,441	$23,885
TOTALS	**1,527,745**	**108,159,101,507**	**171,280,521,370**	**$2,971,169**

Edison Twp BOE– Energy Use & Cost Index

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		SITE EUI		
BUILDING/FACILITY NAME	SQFT	USAGE BTU / SQFT	NATIONAL MEDIAN BTU / SQFT	NATIONAL MEDIAN +/- %
Edison High School	250,499	73,687	68,800	-7%
John P. Stevens High School	220,287	87,417	68,800	-27%
Herbert Hoover Middle School	132,625	52,546	68,800	24%
John Adams Middle School	93,041	69,257	68,800	-1%
Thomas Jefferson Middle School	90,514	66,485	68,800	3%
Woodrow Wilson Middle School	102,122	51,292	68,800	25%
Benjamin Franklin Elementary School	56,975	54,911	68,800	20%
James Madison Intermediate School	44,000	81,534	68,800	-19%
James Madison Primary School	46,000	71,009	68,800	-3%
James Monroe Elementary School	67,800	49,803	68,800	28%
John Marshall Elementary School	62,517	68,126	68,800	1%
Lincoln Elementary School	55,315	148,370	68,800	-116%
Lindeneau Elementary School	45,503	59,953	68,800	13%
Martin Luther King Elementary School	54,136	64,427	68,800	6%
Washington Elementary School	56,410	65,810	68,800	4%
Woodbrook Elementary School	85,954	68,622	68,800	0%
FDR Round Building	14,750	28,138	68,800	59%
Edison Early Learning Center	7,297	106,648	68,800	-55%
Edison Education Center	30,000	53,461	77,800	31%
Building and Grounds	12,000	110,532	60,300	-83%
TOTALS	**1,527,745**	**70,797**	**68,910**	**-3%**

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		SITE ECI		
BUILDING/FACILITY NAME	SQFT	COST $$ / SQFT	NATIONAL MEDIAN $$ / SQFT	NATIONAL MEDIAN +/- %
Edison High School	250,499	$1.91	$1.54	-24%
John P. Stevens High School	220,287	$2.83	$1.54	-84%
Herbert Hoover Middle School	132,625	$1.40	$1.54	9%
John Adams Middle School	93,041	$1.57	$1.54	-2%
Thomas Jefferson Middle School	90,514	$1.29	$1.54	16%
Woodrow Wilson Middle School	102,122	$1.42	$1.54	8%
Benjamin Franklin Elementary School	56,975	$1.23	$1.54	20%
James Madison Intermediate School	44,000	$3.03	$1.54	-96%
James Madison Primary School	46,000	$1.79	$1.54	-16%
James Monroe Elementary School	67,800	$1.69	$1.54	-10%
John Marshall Elementary School	62,517	$2.15	$1.54	-39%
Lincoln Elementary School	55,315	$2.67	$1.54	-74%
Lindeneau Elementary School	45,503	$1.42	$1.54	8%
Martin Luther King Elementary School	54,136	$1.75	$1.54	-13%
Washington Elementary School	56,410	$1.99	$1.54	-29%
Woodbrook Elementary School	85,954	$2.30	$1.54	-49%
FDR Round Building	14,750	$0.92	$1.54	40%
Edison Early Learning Center	7,297	$3.16	$1.54	-105%
Edison Education Center	30,000	$2.08	$1.74	-20%
Building and Grounds	12,000	$1.99	$1.35	-47%
TOTALS	**1,527,745**	**$1.94**	**$1.54**	**-26%**

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Edison High School Baseline Energy Use

Edison High School							ELECTRIC METER #1					
Provider:	PSEG			Account #:	42-609-020-08				Meter #:	9210404 - Main Electric		
Commodity:	Direct Energy			Commodity:	on PSEG bill				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
3/22/22	4/20/22	114,328	367	$1,700	$17,668	$371	$1,387	$21,126	$0.169	30	43%	390,087,136
4/21/22	5/20/22	99,402	393	$1,483	$17,216	$371	$1,487	$20,556	$0.188	30	35%	339,159,624
5/21/22	6/20/22	137,635	435	$2,069	$23,794	$371	$5,649	$31,883	$0.188	31	43%	469,610,620
6/21/22	7/20/22	111,164	274	$1,728	$18,261	$371	$3,710	$24,069	$0.180	30	56%	379,291,568
7/21/22	8/18/22	116,684	287	$1,814	$23,327	$371	$3,883	$29,395	$0.215	29	58%	398,125,808
8/19/22	9/19/22	140,746	429	$2,188	$27,150	$371	$5,811	$35,520	$0.208	32	43%	480,225,352
9/20/22	10/18/22	112,682	419	$1,805	$21,410	$371	$1,871	$25,456	$0.206	29	39%	384,470,984
10/19/22	11/16/22	108,599	354	$1,774	$35,605	$371	$1,581	$39,331	$0.344	29	44%	370,539,788
11/17/22	12/19/22	132,520	357	$2,165	$20,419	$371	$1,596	$24,551	$0.170	33	47%	452,158,240
12/20/22	1/20/23	125,393	362	$2,049	$17,555	$371	$1,618	$21,593	$0.156	32	45%	427,840,916
1/21/23	2/17/23	123,678	378	$2,029	$16,927	$371	$1,691	$21,017	$0.153	28	49%	421,989,336
2/18/23	3/21/23	134,976	372	$2,219	$16,983	$371	$1,660	$21,233	$0.142	32	47%	460,538,112
TOTALS		1,457,807	435	$23,022	$256,314	$4,450	$31,944	$315,730	$0.192	365	38%	4,974,037,484

Edison High School							ELECTRIC METER #2					
Provider:	PSEG			Account #	75-436-309-07				Meter #	286002957 - Addition/Stad Lighting		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
3/22/22	4/20/22	2,340	85	$52	$221	$5	$337	$615	$0.117	30	4%	7,984,080
4/21/22	5/19/22	2,610	76	$58	$247	$5	$299	$609	$0.117	29	5%	8,905,320
5/20/22	6/18/22	90	4	$42	$9	$5	$17	$72	$0.566	30	3%	307,080
6/19/22	7/20/22	72	5	$1	$7	$5	$66	$79	$0.113	32	2%	245,664
7/21/22	8/18/22	90	5	$2	$9	$5	$66	$81	$0.113	29	3%	307,080
8/19/22	9/19/22	108	77	$2	$10	$5	$1,133	$1,150	$0.113	32	0%	368,496
9/20/22	10/18/22	90	78	$2	$9	$5	$364	$379	$0.118	29	0%	307,080
10/19/22	11/16/22	90	82	$2	$9	$5	$383	$398	$0.118	29	0%	307,080
11/17/22	12/19/22	648	85	$15	$511	$5	$397	$928	$0.812	33	1%	2,210,976
12/20/22	1/20/23	1,008	83	$24	$581	$5	$387	$997	$0.600	32	2%	3,439,296
1/21/23	2/17/23	34,615	85	$828	$3,703	$5	$397	$4,933	$0.131	28	60%	118,106,380
2/18/23								$0	$0.00	(44974)	0%	0
TOTALS		41,761	85	$1,029	$5,314	$54	$3,845	$10,242	$0.152	(44641)	0%	142,488,532

Edison High School							ELECTRIC METER #3					
Provider:	PSEG			Account #:	75-436-311-05				Meter #:	126912562 - Athletic Field		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
3/22/22	4/20/22	228	2	$5	$22	$5	$9	$41	$0.12	30	14%	777,936
4/21/22	5/19/22	248	3	$6	$23	$5	$10	$44	$0.12	29	14%	846,176
5/20/22	6/18/22	1	1	$0	$0	$5	$0	$5	$0.11	30	0%	3,412
6/19/22	7/20/22	1	1	$0	$0	$5	$0	$5	$0.11	32	0%	3,412
7/21/22	8/18/22	1	1	$0	$0	$5	$0	$5	$0.11	29	0%	3,412
8/19/22	9/19/22	1	1	$0	$0	$5	$0	$5	$0.17	32	0%	3,412
9/20/22	10/18/22	1	1	$0	$0	$5	$0	$5	$0.11	29	0%	3,412
10/19/22	11/16/22	1	1	$0	$0	$5	$0	$5	$0.10	29	0%	3,412
11/17/22	12/19/22	63	6	$2	$7	$5	$3	$17	$0.14	33	1%	214,956
12/20/22	1/20/23	104	1	$2	$14	$5	$5	$26	$0.16	32	14%	354,848
1/21/23	2/17/23	0	0	$0	$0	$5	$0	$5	$0.00	28	$0.00	0
2/18/23	3/21/23	150	2	$4	$20	$5	$7	$36	$0.16	32	13%	511,800
TOTALS		799	6	$18	$87	$59	$33	$198	$0.13	365	2%	2,726,188

Edison High School						Natural Gas Meter #1		
Provider	PSEG		Account #	4260902008		Meter #	3928276 - Addition	
Commodity	Direct Energy		Commodity	361149		Rate Tariff:	General Service Gas	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/22/22	4/20/22	824	$274	$19	$428	$720	$0.85	115,956,600
4/21/22	5/20/22	864	$287	$19	$448	$754	$0.85	111,023,900
5/20/22	6/20/22	703	$238	$19	$365	$621	$0.86	99,120,300
6/21/22	7/20/22	605	$213	$19	$296	$527	$0.84	85,012,900
7/21/22	8/18/22	476	$168	$19	$247	$434	$0.87	94,072,100
8/19/22	9/19/22	569	$55	$164	$294	$513	$0.61	80,600,000
9/20/22	10/18/22	780	$299	$19	$405	$723	$0.90	88,999,600
10/19/22	11/16/22	730	$290	$19	$379	$688	$0.92	62,393,600
11/17/22	12/16/22	758	$302	$20	$393	$715	$0.92	76,073,900
12/17/22	1/20/23	853	$344	$20	$634	$997	$1.15	60,284,800
1/21/23	2/17/23	756	$309	$20	$695	$1,024	$1.33	85,132,600
2/18/23	3/21/23	828	$336	$20	$762	$1,117	$1.33	82,406,800
TOTALS		8,746	$3,115	$376	$5,344	$8,835	$0.97	1,041,077,100

Edison High School						Natural Gas Meter #2		
Provider	PSEG		Account #	4260902008		Meter #	3637127 - Main Gas	
Commodity	Direct Energy		Commodity	612740		Rate Tariff	Large Volume Gas	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
3/22/22	4/20/22	13,730	$2,314	$164	$7,124	$9,602	$0.69	471,656,400
4/21/22	5/20/22	2,065	$343	$164	$1,071	$1,578	$0.68	7,510,700
5/20/22	6/20/22	30	$2	$168	$15	$185	$0.59	2,422,900
6/21/22	7/20/22	25	$2	$170	$12	$185	$0.58	881,900
7/21/22	8/18/22	23	$2	$170	$12	$184	$0.61	2,098,600
8/19/22	9/19/22	12	$1	$170	$6	$178	$0.59	56,607,000
9/20/22	10/18/22	1,534	$272	$170	$796	$1,238	$0.70	1,153,957,000
10/19/22	11/16/22	7,515	$6,556	$170	$3,899	$10,625	$1.39	2,763,197,300
11/17/22	12/16/22	23,233	$9,515	$173	$12,054	$21,743	$0.93	3,354,534,000
12/17/22	1/20/23	29,553	$10,752	$176	$15,333	$26,261	$0.88	3,207,418,800
1/21/23	2/17/23	22,826	$7,980	$176	$20,996	$29,152	$1.27	2,278,931,200
2/18/23	3/21/23	24,102	$8,217	$176	$22,170	$30,563	$1.26	1,373,027,100
TOTALS		124,648	$45,956	$2,047	$83,490	$131,493	$1.04	14,672,242,900

Edison High School								
Provider	Edison Water Utility, Edison Twp Sewer			Water & Sewer (Gal)				
Acct #	90048531- 00106857/70106857 (combined)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Water Fixed Charges	Water Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
3/12/22	4/25/22	100,232	$641	$0	$968	$1,609	$0.0097	0
4/26/22	5/20/22	56,100	$641	$0	$542	$1,183	$0.0097	0
5/21/22	6/21/22	61,336	$641	$0	$592	$1,233	$0.0097	0
6/22/22	7/29/22	1,496	$641	$0	$14	$655	$0.0097	0
7/30/22	8/19/22	3,740	$641	$0	$36	$677	$0.0097	0
8/20/22	9/26/22	52,360	$641	$0	$506	$1,147	$0.0097	0
9/27/22	10/28/22	47,124	$641	$0	$455	$1,096	$0.0097	0
10/29/22	11/30/22	91,256	$641	$0	$881	$1,522	$0.0097	0
12/1/22	12/15/22	50,864	$641	$0	$491	$1,132	$0.0097	0
12/16/22	2/1/23	113,696	$641	$0	$1,098	$1,739	$0.0097	0
2/2/23	2/24/23	67,320	$641	$0	$650	$1,291	$0.0097	0
						$0	$0.00	0
TOTALS		645,524	$7,050	$0	$6,234	$13,284	$0.0097	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

J.P. Stevens High School Baseline Energy Use

John P. Stevens High School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-019-07				Meter #	57621754 - Addition		
Commodity:	Direct Energy			Commodity:	on PSEG bill				Rate Tariff:	General Light and Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/21/22	3/22/22	1,830	4	$44	$247	$5	$17	$313	$0.159	30	69%	6,243,960
3/23/22	4/21/22	582	3	$13	$91	$5	$11	$120	$0.178	30	29%	1,985,784
4/22/22	5/20/22	618	5	$14	$107	$5	$20	$145	$0.195	29	18%	2,108,616
5/21/22	6/21/22	750	4	$13	$130	$5	$55	$203	$0.191	32	25%	2,559,000
6/22/22	7/21/22	816	4	$15	$134	$5	$59	$212	$0.182	30	28%	2,784,192
7/22/22	8/19/22	54	6	$17	$11	$5	$86	$119	$0.519	29	1%	184,248
8/20/22	9/20/22	1,074	7	$19	$206	$5	$95	$326	$0.210	32	22%	3,664,488
9/21/22	10/19/22	960	9	$23	$159	$5	$43	$229	$0.189	29	15%	3,275,520
10/20/22	11/17/22	702	10	$17	$109	$5	$48	$178	$0.179	29	10%	2,395,224
11/18/22	12/20/22	1,104	6	$26	$172	$5	$26	$229	$0.179	33	25%	3,766,848
12/21/22	1/23/23	1,026	2	$24	$192	$5	$7	$229	$0.211	34	79%	3,500,712
1/24/23	2/21/23	1,830	4	$44	$247	$5	$17	$313	$0.159	29	71%	6,243,960
TOTALS		11,346	10	$269	$1,803	$59	$484	$2,616	$0.183	366	13%	38,712,552

John P. Stevens High School							ELECTRIC METER #2					
Provider:	PSEG			Account #	42-609-019-07				Meter #	9210275 - Main Electric		
Commodity:	Direct Energy			Commodity	on PSEG bill				Rate Tariff	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/21/22	3/22/22	183,100	400	$2,722	$28,599	$371	$1,514	$33,206	$0.171	30	64%	624,737,200
3/23/22	4/21/22	144,311	393	$2,146	$22,540	$371	$1,487	$26,544	$0.171	30	51%	492,389,132
4/22/22	5/20/22	139,237	385	$2,077	$24,103	$371	$1,458	$28,009	$0.188	29	52%	475,076,644
5/21/22	6/21/22	158,347	431	$2,385	$27,411	$371	$5,607	$35,774	$0.188	32	48%	540,279,964
6/22/22	7/21/22	136,807	370	$2,126	$22,410	$371	$5,012	$29,919	$0.179	30	51%	466,785,484
7/22/22	8/19/22	132,874	322	$2,066	$26,740	$371	$4,360	$33,536	$0.217	29	59%	453,366,088
8/20/22	9/20/22	166,389	458	$2,587	$31,977	$371	$6,201	$41,136	$0.208	32	47%	567,719,268
9/21/22	10/19/22	145,913	438	$2,346	$24,122	$371	$1,961	$28,799	$0.181	29	48%	497,855,156
10/20/22	11/17/22	145,507	405	$2,377	$22,524	$371	$1,811	$27,083	$0.171	29	52%	496,469,884
11/18/22	12/20/22	186,231	423	$3,042	$28,948	$371	$1,890	$34,252	$0.172	33	56%	635,420,172
12/21/22	1/23/23	175,441	416	$2,866	$33,364	$371	$1,859	$38,460	$0.207	34	52%	598,604,692
1/24/23	2/21/23	178,307	426	$2,925	$24,084	$371	$1,902	$29,283	$0.151	29	60%	608,383,484
TOTALS		1,892,464	458	$29,665	$316,824	$4,450	$35,063	$386,002	$0.183	366	47%	6,457,087,168

John P. Stevens High School							ELECTRIC METER #3					
Provider:	PSEG			Account #	75-436-291-00				Meter #	16434751 - Field Lighting		
Commodity:	Direct Energy			Commodity	on PSEG bill				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/19/22	4/21/22	2,609	146	$58	$392	$10	$580	$1,039	$0.17	62	1%	8,901,908
4/22/22	5/20/22	151	0	$3	$26	$5	$2	$36	$0.20	29	54%	515,212
5/21/22	6/21/22	171	1	$3	$30	$5	$8	$46	$0.19	32	37%	583,452
6/22/22	7/21/22	176	1	$3	$29	$5	$9	$46	$0.18	30	41%	600,512
7/22/22	8/19/22	553	72	$10	$111	$5	$1,048	$1,174	$0.22	29	1%	1,886,836
8/20/22	9/20/22	3,103	72	$56	$708	$5	$1,059	$1,827	$0.25	32	6%	10,587,436
9/21/22	10/19/22	6,187	73	$146	$985	$5	$339	$1,475	$0.18	29	12%	21,110,044
10/20/22	2/21/23	543	210	$13	$86	$20	$977	$1,096	$0.18	125	0%	1,852,716
								$0	$0.00	1	$0.00	0
								$0	$0.00	1	$0.00	0
								$0	$0.00	1	$0.00	0
								$0	$0.00	1	$0.00	0
TOTALS		13,493	210	$293	$2,366	$59	$4,021	$6,739	$0.20	372	1%	46,038,116

John P. Stevens High School							ELECTRIC METER #4					
Provider:	PSEG			Account #	75-436-318-06				Meter #	626107424 - Farm Stand		
Commodity:	PSEG BGS			Commodity	on PSEG bill				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/19/22	3/22/22	813	12	$18	$98	$5	$46	$167	$0.143	32	9%	2,773,956
3/23/22	4/21/22	839	12	$19	$104	$5	$48	$176	$0.147	30	10%	2,862,668
4/22/22	5/20/22	836	12	$19	$104	$5	$46	$174	$0.147	29	10%	2,852,432
5/21/22	6/21/22	991	7	$17	$112	$5	$93	$227	$0.131	32	20%	3,381,292
6/22/22	7/21/22	958	5	$17	$110	$5	$75	$207	$0.133	30	26%	3,268,696
7/22/22	8/19/22	1,163	5	$21	$122	$5	$73	$221	$0.123	29	33%	3,968,156
8/20/22	9/20/22	1,058	5	$19	$103	$5	$78	$205	$0.116	32	26%	3,609,896
9/21/22	10/19/22	1,163	13	$28	$100	$5	$58	$191	$0.110	29	13%	3,968,156
10/20/22	11/17/22	1,434	13	$34	$113	$5	$60	$211	$0.102	29	16%	4,892,808
11/18/22	12/20/22	2,269	13	$54	$174	$5	$60	$293	$0.100	33	22%	7,741,828
12/21/22	1/23/23	790	14	$19	$116	$5	$67	$207	$0.171	34	7%	2,695,480
1/24/23	2/21/23	3,628	15	$87	$303	$5	$70	$465	$0.108	29	35%	12,378,736
TOTALS		15,942	15	$352	$1,560	$59	$772	$2,743	$0.120	368	12%	54,394,104

John P. Stevens High School							ELECTRIC METER #5					
Provider:	PSEG			Account #	75 436 301 09				Meter #	626071641 - Sign		
Commodity:	Direct Energy			Commodity	1315525				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	200	1	$4	$19	$5	$2	$30	$0.118	32	52%	682,400
3/23/22	4/21/22	186	0	$4	$18	$5	$2	$28	$0.118	30	65%	634,632
4/22/22	5/20/22	183	1	$4	$18	$5	$2	$28	$0.118	29	53%	624,396
5/21/22	6/21/22	211	1	$4	$20	$5	$7	$36	$0.113	32	55%	719,932
6/22/22	7/21/22	24	1	$0	$2	$5	$7	$15	$0.114	30	7%	81,888
7/22/22	8/19/22	0	0	$0	$0	$5	$0	$5	$0.00	29	$0.00	0
9/20/21	9/20/22	123	1	$2	$12	$5	$7	$26	$0.114	366	3%	419,676
9/21/22	10/19/22	139	0	$3	$13	$5	$2	$23	$0.120	29	50%	474,268
10/20/22	11/17/22	133	1	$3	$13	$5	$2	$23	$0.120	29	38%	453,796
11/18/22	12/20/22	158	0	$4	$15	$5	$1	$25	$0.120	33	66%	539,096
12/21/22	1/23/23	217	0	$5	$21	$5	$1	$32	$0.120	34	89%	740,404
1/24/23	2/21/23	75	0	$2	$7	$5	$1	$15	$0.120	29	36%	255,900
TOTALS		1,649	1	$36	$158	$59	$36	$289	$0.118	702	20%	5,626,388

John P. Stevens High School							Natural Gas Meter #1	
Provider	Elizabethtown Gas		Account #	6379478221			Meter #	2545405 - Main Gas
Commodity	Direct Energy		Commodity	777166			Rate Tariff:	General Delivery Service
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
3/1/22	3/31/21	18,902	$7,722	$38	$8,381	$16,140	$0.85	1,105,412,000
3/31/22	4/30/22	11,511	$5,332	$38	$5,598	$10,968	$0.95	93,060,000
5/1/22	5/31/22	2,053	$2,283	$38	$999	$3,319	$1.60	90,816,000
5/31/22	6/30/22	849	$1,880	$38	$413	$2,330	$2.70	81,449,000
7/1/22	7/31/22	589	$1,801	$38	$287	$2,125	$3.55	85,490,000
8/1/22	8/31/22	599	$1,804	$38	$292	$2,133	$3.50	95,976,000
9/1/22	9/30/22	826	$2,241	$62	$402	$2,705	$3.20	412,566,000
10/1/22	10/31/22	9,337	$5,170	$62	$4,541	$9,773	$1.04	1,407,979,000
11/1/22	11/30/22	15,552	$7,304	$62	$7,562	$14,928	$0.96	2,188,927,000
12/1/22	12/31/22	24,138	$10,253	$62	$21,728	$32,043	$1.32	2,500,904,000
1/1/23	1/31/23	22,232	$9,591	$62	$20,011	$29,664	$1.33	2,556,594,000
2/1/23	2/28/23	19,961	$9,025	$62	$17,967	$27,053	$1.35	1,890,198,000
TOTALS		126,549	$64,405	$596	$88,181	$153,182	$1.21	12,509,371,000

John P. Stevens High School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	3655300000 - 19535523 (FPM)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	0	$540	$0	$0	$540	$0.00	0
3/17/22	4/19/22	0	$540	$0	$0	$540	$0.00	0
4/20/22	5/17/22	0	$540	$0	$0	$540	$0.00	0
5/18/22	6/16/22	0	$540	$0	$0	$540	$0.00	0
6/17/22	7/19/22	0	$540	$0	$0	$540	$0.00	0
7/20/22	8/16/22	0	$540	$0	$0	$540	$0.00	0
8/17/22	9/19/22	0	$540	$0	$0	$540	$0.00	0
9/20/22	10/18/22	0	$540	$0	$0	$540	$0.00	0
10/19/22	11/17/22	0	$540	$0	$0	$540	$0.00	0
11/18/22	12/16/22	0	$540	$0	$0	$540	$0.00	0
12/17/22	1/19/23	8,228	$535	$41	$79	$655	$0.0146	0
1/20/23	2/16/23	0	$531	$0	$0	$531	$0.00	0
TOTALS		8,228	$6,462	$41	$79	$6,583	$0.0146	0

John P. Stevens High School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	4945300000- 72008228/19434871							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	203,456	$765	$1,668	$1,965	$4,398	$0.0179	0
3/17/22	4/19/22	225,896	$765	$1,852	$2,182	$4,799	$0.0179	0
4/20/22	5/17/22	168,300	$765	$1,380	$1,625	$3,770	$0.0179	0
5/18/22	6/16/22	400,928	$1,479	$3,287	$3,872	$8,638	$0.0179	0
6/17/22	7/19/55	172,788	$765	$1,417	$1,669	$3,850	$0.0179	0
7/20/55	8/16/22	245,344	$765	$2,012	$2,370	$5,146	$0.0179	0
8/17/22	9/19/22	460,768	$765	$3,778	$4,450	$8,993	$0.0179	0
9/20/22	10/18/22	53,108	$956	$1,576	$513	$3,045	$0.0393	0
10/19/22	11/17/22	213,928	$765	$1,754	$2,066	$4,585	$0.0179	0
11/18/22	12/16/22	198,968	$765	$1,631	$1,922	$4,318	$0.0179	0
12/17/22	1/19/23	204,952	$789	$1,760	$1,979	$4,528	$0.0182	0
1/20/23	2/16/23	211,684	$808	$1,883	$2,044	$4,735	$0.0186	0
TOTALS		2,760,120	$10,150	$23,997	$26,657	$60,805	$0.0184	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Herbert Hoover Middle School Baseline Energy Use

Herbert Hoover Middle School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-018-18				Meter #	9206690 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/26/22	3/28/22	54,807	146	$815	$5,185	$371	$552	$6,922	$0.109	31	51%	187,001,484
3/29/22	4/27/22	47,580	154	$707	$4,501	$371	$584	$6,164	$0.109	30	43%	162,342,960
4/28/22	5/26/22	47,369	169	$707	$4,481	$371	$641	$6,200	$0.110	29	40%	161,623,028
5/27/22	6/27/22	48,963	198	$740	$4,632	$371	$2,604	$8,347	$0.110	32	32%	167,061,756
6/28/22	7/27/22	39,778	143	$618	$3,763	$371	$1,943	$6,695	$0.110	30	39%	135,722,536
7/28/22	8/25/22	36,678	125	$570	$3,470	$371	$1,699	$6,110	$0.110	29	42%	125,145,336
8/26/22	9/26/22	54,012	200	$839	$8,399	$371	$2,708	$12,318	$0.171	32	35%	184,288,944
9/27/22	10/26/22	44,688	141	$725	$5,646	$371	$631	$7,373	$0.143	30	44%	152,475,456
10/27/22	11/23/22	45,596	147	$761	$5,732	$371	$655	$7,520	$0.142	28	46%	155,573,552
11/24/22	12/27/22	60,196	153	$983	$9,501	$371	$685	$11,540	$0.174	34	48%	205,388,752
12/28/22	1/26/23	55,045	151	$899	$6,075	$371	$673	$8,018	$0.127	30	51%	187,813,540
1/27/23	2/27/23	57,110	145	$938	$5,965	$371	$650	$7,924	$0.121	32	51%	194,859,320
TOTALS		591,822	200	$9,303	$67,349	$4,452	$14,025	$95,129	$0.130	367	34%	2,019,296,664

Herbert Hoover Middle School						Natural Gas Meter #1		
Provider	Ellizabethtown Gas		Account #	5507086521		Meter #	3204591 - Main Gas	
Commodity	Direct Energy		Commodity	777165		Rate Tariff:	General Delivery Service	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/1/22	3/31/22	7,788	$3,467	$38	$3,787	$7,291	$0.93	43,470,000
4/1/22	4/30/22	4,001	$2,246	$38	$1,945	$4,229	$1.05	17,544,000
5/1/22	5/31/22	1,058	$1,297	$38	$515	$1,849	$1.71	13,390,000
6/1/22	6/30/22	228	$1,025	$38	$111	$1,174	$4.99	15,495,000
7/1/22	7/31/22	124	$994	$38	$60	$1,092	$8.50	24,850,000
8/1/22	8/31/22	114	$990	$38	$55	$1,083	$9.20	45,452,000
9/1/22	9/30/22	248	$1,241	$62	$121	$1,423	$5.49	662,933,000
10/1/22	10/31/22	1,747	$1,758	$62	$850	$2,669	$1.49	839,016,000
11/1/22	11/30/22	5,986	$3,213	$62	$2,911	$6,186	$1.02	1,320,101,000
12/1/22	12/31/22	10,732	$4,844	$62	$9,661	$14,567	$1.35	997,518,000
1/1/23	1/31/23	10,071	$4,613	$62	$9,064	$13,739	$1.36	778,787,000
2/1/23	2/28/23	7,401	$3,776	$62	$6,661	$10,499	$1.41	400,082,000
TOTALS		49,496	$29,464	$596	$35,741	$65,801	$1.32	5,158,638,000

Herbert Hoover Middle School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	3835300000- 19434851							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/16/22	3/15/22	80,036	$478	$656	$773	$1,907	$0.0179	0
3/16/22	4/18/22	99,484	$478	$816	$961	$2,254	$0.0179	0
4/19/22	5/16/22	68,816	$478	$564	$665	$1,707	$0.0179	0
5/17/22	6/15/22	97,988	$478	$803	$946	$2,228	$0.0179	0
6/16/22	7/18/22	45,628	$478	$374	$441	$1,293	$0.0179	0
7/19/22	8/15/22	70,312	$478	$576	$679	$1,734	$0.0179	0
8/16/22	9/16/22	97,240	$478	$797	$939	$2,214	$0.0179	0
9/17/22	10/17/22	99,484	$478	$816	$961	$2,254	$0.0179	0
10/18/22	11/16/22	94,996	$478	$779	$917	$2,174	$0.0179	0
11/17/22	12/15/22	83,776	$478	$687	$809	$1,974	$0.0179	0
12/16/22	1/18/23	81,532	$492	$698	$787	$1,978	$0.0182	0
1/19/23	2/15/23	90,508	$505	$805	$0	$1,310	$0.0089	0
TOTALS		1,009,800	$5,777	$8,372	$8,879	$23,028	$0.0171	0

Herbert Hoover Middle School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	5703400000- 00000460 (FPM)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/16/22	3/15/22	0	$400	$0	$0	$400	$0.00	0
3/16/22	4/18/22	0	$400	$0	$0	$400	$0.00	0
4/19/22	5/16/22	0	$400	$0	$0	$400	$0.00	0
5/17/22	6/15/22	0	$400	$0	$0	$400	$0.00	0
6/16/22	7/18/22	0	$400	$0	$0	$400	$0.00	0
7/19/22	8/15/22	0	$400	$0	$0	$400	$0.00	0
8/16/22	9/16/22	0	$400	$0	$0	$400	$0.00	0
9/17/22	10/17/22	0	$400	$0	$0	$400	$0.00	0
10/18/22	11/16/22	0	$400	$0	$0	$400	$0.00	0
11/17/22	12/16/22	0	$400	$0	$0	$400	$0.00	0
12/17/22	1/18/23	0	$794	$0	$0	$794	$0.00	0
1/19/23	2/15/23	0	$394	$0	$0	$394	$0.00	0
TOTALS		0	$5,188	$0	$0	$5,188	$0.00	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

John Adams Middle School Baseline Energy Use

John Adams Middle School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-015-08				Meter #	9207503 - Main Electric		
Commodity:	Direct Energy			Commodity:	1350515				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/24/22	3/24/22	49,408	156.9	$690	$4,388	$371	$594	$6,043	$0.103	29	45%	168,580,096
3/25/22	4/25/22	39,598	144.6	$589	$3,746	$371	$547	$5,253	$0.109	32	36%	135,108,376
4/26/22	5/24/22	36,013	130.8	$538	$3,407	$371	$495	$4,810	$0.110	29	40%	122,876,356
5/25/22	6/23/22	34,407	146.1	$518	$3,256	$371	$1,909	$6,054	$0.110	30	33%	117,396,684
6/24/22	7/25/22	18,390	55.3	$286	$1,744	$371	$749	$3,149	$0.110	32	43%	62,746,680
7/26/22	8/23/22	16,419	55.3	$255	$1,557	$371	$749	$2,932	$0.110	29	43%	56,021,628
8/24/22	9/22/22	35,510	150.6	$552	$3,359	$371	$2,040	$6,323	$0.110	30	33%	121,160,120
9/23/22	10/21/22	35,029	133.4	$566	$3,314	$371	$596	$4,847	$0.111	29	38%	119,518,948
10/22/22	11/21/22	41,052	130.5	$671	$3,883	$371	$583	$5,507	$0.111	31	42%	140,069,424
11/22/22	12/22/22	48,204	148.4	$788	$4,558	$371	$663	$6,379	$0.111	31	44%	164,472,048
12/23/22	1/24/23	46,970	142.8	$767	$6,043	$371	$638	$7,819	$0.145	33	42%	160,261,640
1/25/23	2/23/23	46,639	139.2	$766	$5,270	$371	$622	$7,028	$0.129	30	47%	159,132,268
TOTALS		447,639	157	$6,985	$44,523	$4,450	$10,186	$66,145	$0.115	365	33%	1,527,344,268

John Adams Middle School							ELECTRIC METER #2					
Provider:	PSEG			Account #	75-436-289-02				Meter #	727000642 - Score board		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	0	0	$0	$0	$5	$0	$5	$0.00	32	0%	0
3/22/22	4/21/22	0	0	$0	$0	$5	$0	$5	$0.00	31	0%	0
4/22/22	5/20/22	0	0	$0	$0	$5	$0	$5	$0.00	29	0%	0
5/21/22	6/21/22	0	0	$0	$0	$5	$0	$5	$0.00	32	0%	0
6/22/22	7/21/22	0	0	$0	$0	$5	$0	$5	$0.00	30	0%	0
7/22/22	8/19/22	0	0	$0	$0	$5	$0	$5	$0.00	29	0%	0
8/20/22	9/20/22	0	0	$0	$0	$5	$0	$5	$0.00	32	0%	0
9/21/22	10/19/22	0	0	$0	$0	$5	$0	$5	$0.00	29	0%	0
10/20/22	11/17/22	0	0	$0	$0	$5	$0	$5	$0.00	29	0%	0
11/18/22	12/20/22	0	0	$0	$0	$5	$0	$5	$0.00	33	0%	0
12/21/22	1/23/23	0	0	$0	$0	$5	$0	$5	$0.00	34	0%	0
1/24/23	2/21/23	0	0	$0	$0	$5	$0	$5	$0.00	29	0%	0
TOTALS		0	0	$1	$0	$58	$0	$59	$0.00	369	0%	0

John Adams Middle School						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	8212285980		Meter #	2285509 - Main Gas	
Commodity	Direct Energy		Account #	777168		Rate Tariff	General Delivery Service	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
2/28/22	3/31/22	8,804	$3,596	$38	$4,281	$7,914	$0.89	221,490,000
3/31/22	4/30/22	5,318	$2,489	$38	$2,586	$5,112	$0.95	21,672,000
5/1/22	5/31/22	1,369	$1,198	$38	$666	$1,902	$1.36	16,480,000
6/1/22	6/30/22	279	$843	$38	$136	$1,016	$3.50	15,495,000
7/1/22	7/31/22	165	$808	$38	$81	$926	$5.37	26,910,000
8/1/22	8/31/22	186	$814	$38	$91	$942	$4.86	106,399,000
9/1/22	9/30/22	300	$1,018	$62	$146	$1,226	$3.88	701,080,000
10/1/22	10/31/22	3,185	$2,011	$62	$1,549	$3,622	$1.12	1,155,840,000
11/1/22	11/30/22	5,542	$2,820	$62	$2,695	$5,577	$1.00	1,448,689,000
12/1/22	12/31/22	8,978	$4,001	$62	$8,082	$12,144	$1.35	1,083,672,000
1/1/23	1/31/23	7,938	$3,541	$62	$7,146	$10,748	$1.35	880,413,000
2/1/23	2/28/23	7,100	$3,429	$62	$6,390	$9,881	$1.38	531,766,000
TOTALS		49,164	$26,567	$596	$33,847	$61,009	$1.23	6,209,906,000

John Adams Middle School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	2945300000- 19535580							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	54,604	$956	$448	$527	$1,931	$0.0179	0
5/18/21	4/19/22	65,824	$956	$540	$636	$2,131	$0.0179	0
4/20/22	5/17/22	34,408	$956	$282	$332	$1,570	$0.0179	0
5/18/22	6/16/22	75,548	$956	$619	$730	$2,305	$0.0179	0
6/17/22	7/19/22	11,968	$956	$98	$116	$1,170	$0.0179	0
7/20/22	8/16/22	23,936	$956	$196	$231	$1,383	$0.0179	0
8/17/22	9/19/22	35,156	$956	$288	$340	$1,584	$0.0179	0
9/20/22	10/18/22	53,108	$956	$435	$513	$1,904	$0.0179	0
10/19/22	11/17/22	55,352	$956	$454	$535	$1,944	$0.0179	0
11/18/22	12/16/22	54,604	$956	$448	$527	$1,931	$0.0179	0
12/17/22	1/19/23	55,352	$986	$475	$535	$1,996	$0.0182	0
1/20/23	2/16/23	62,084	$1,010	$552	$600	$2,162	$0.0186	0
TOTALS		581,944	$11,556	$4,836	$5,620	$22,013	$0.0180	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Thomas Jefferson Middle School Baseline Energy Use

Thomas Jefferson Middle School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-014-00				Meter #	9210379 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/15/22	4/12/22	34,841	107	$518	$1,463	$371	$406	$2,757	$0.057	29	47%	118,877,492
4/13/22	5/12/22	30,919	114	$461	$1,237	$371	$430	$2,499	$0.055	30	38%	105,495,628
5/13/22	6/13/22	35,978	143	$538	$1,541	$371	$1,837	$4,285	$0.058	32	33%	122,756,936
6/14/22	7/13/22	19,318	119	$299	$809	$371	$1,614	$3,093	$0.057	30	22%	65,913,016
7/14/22	8/11/22	12,147	57	$189	$533	$371	$772	$1,864	$0.059	29	31%	41,445,564
8/12/22	9/12/22	23,201	148	$361	$2,200	$371	$2,008	$4,939	$0.110	32	20%	79,161,812
9/13/22	10/11/22	34,233	144	$542	$3,239	$371	$644	$4,795	$0.110	29	34%	116,802,996
10/12/22	11/9/22	36,333	132	$594	$3,437	$371	$589	$4,990	$0.111	29	40%	123,968,196
11/10/22	12/12/22	38,523	119	$629	$3,644	$371	$531	$5,175	$0.111	33	41%	131,440,476
12/13/22	1/12/23	37,593	118	$614	$3,555	$371	$529	$5,068	$0.111	31	43%	128,267,316
1/13/23	2/13/23	38,552	119	$631	$4,960	$371	$532	$6,494	$0.145	32	42%	131,539,424
2/14/23	3/14/23	41,760	119	$687	$4,719	$371	$531	$6,307	$0.129	29	51%	142,485,120
TOTALS		383,398	148	$6,062	$31,334	$4,450	$10,422	$52,267	$0.098	365	30%	1,308,153,976

Thomas Jefferson Middle School							Natural Gas Meter #1	
Provider	PSE&G		Account #	7543630206			Meter #	3637622 - Main Gas
Commodity	Direct Energy		Account #	361153			Rate Tariff	Large Volume Gas
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
3/22/22	4/20/22	3,210	$538	$164	$1,666	$2,368	$0.69	108,397,400
4/21/22	7/20/22	809	$132	$502	$395	$1,030	$0.65	0
7/21/22	9/19/22	5	$0	$341	$6	$347	$1.20	0
9/20/22	10/17/22	606	$105	$170	$314	$589	$0.69	0
10/18/22	11/16/22	4,411	$2,285	$170	$2,289	$4,744	$1.04	855,200
11/17/22	12/16/22	8,651	$3,086	$173	$4,489	$7,748	$0.88	747,600
12/17/22	1/20/23	11,630	$3,656	$176	$8,699	$12,532	$1.06	237,493,900
1/21/23	2/17/23	8,729	$3,043	$176	$8,030	$11,249	$1.27	660,036,800
2/18/23	3/21/23	5,986	$2,534	$176	$5,506	$8,216	$1.34	905,166,800
						$0	-	885,495,200
						$0	-	562,659,500
						$0	-	321,014,800
TOTALS		44,038	$15,379	$2,049	$31,394	$48,822	$1.06	3,681,867,200

Thomas Jefferson Middle School						Natural Gas Meter #2		
Provider	PSEG		Account #	7543630818		Meter #	3834325 - Addition	
Commodity	Direct Energy		Commodity	361156		Rate Tariff	General Service Gas	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
3/22/22	4/20/22	540	$216	$19	$280	$514	$0.92	20,759,000
4/21/22	5/20/22	504	$201	$19	$261	$481	$0.92	17,998,200
5/21/22	6/17/22	357	$121	$19	$185	$325	$0.86	13,042,200
6/18/22	7/19/22	47	$17	$19	$23	$59	$0.84	11,488,200
7/20/22	8/17/22	21	$7	$19	$11	$37	$0.87	16,114,700
8/18/22	9/16/22	105	$37	$19	$54	$110	$0.87	26,344,000
9/17/22	10/17/22	249	$101	$19	$129	$250	$0.93	25,145,300
10/18/22	11/15/22	250	$106	$19	$130	$255	$0.94	27,858,000
11/16/22	12/16/22	302	$131	$20	$157	$307	$0.95	27,206,600
12/17/22	1/19/23	258	$110	$19	$192	$321	$1.17	53,260,300
1/20/23	2/16/23	212	$90	$19	$195	$305	$1.35	55,987,400
2/17/23	3/20/23	215	$90	$19	$198	$307	$1.34	53,994,200
TOTALS		3,059	$1,227	$229	$1,815	$3,270	$0.99	349,198,100

Thomas Jefferson Middle School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90024710- 326164/70326164 (combined)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/24/22	3/17/22	68,068	$348	$0	$657	$1,005	$0.0097	0
3/18/22	4/22/22	65,824	$348	$0	$636	$983	$0.0097	0
4/23/22	5/18/22	49,368	$348	$0	$477	$824	$0.0097	0
5/19/22	6/21/22	68,068	$348	$0	$657	$1,005	$0.0097	0
6/22/22	7/26/22	114,444	$348	$0	$1,105	$1,453	$0.0097	0
7/27/22	8/19/20	14,960	$348	$0	$144	$492	$0.0097	0
8/20/20	9/21/22	103,224	$348	$0	$997	$1,345	$0.0097	0
9/22/22	10/24/22	150,348	$348	$0	$1,452	$1,800	$0.0097	0
10/25/22	11/23/22	77,792	$348	$0	$751	$1,099	$0.0097	0
11/24/22	12/15/22	79,288	$348	$0	$766	$1,113	$0.0097	0
12/16/22	1/30/23	32,164	$348	$0	$311	$658	$0.0097	0
1/31/23	2/22/23	46,376	$348	$0	$448	$796	$0.0097	0
TOTALS		869,924	$4,172	$0	$8,402	$12,574	$0.0097	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Woodrow Wilson Middle School Baseline Energy Use

Woodrow Wilson Middle School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-022-02				Meter #	9217285 - Main Electric		
Commodity:	PSEG BGS			Commodity:	on PSEG bill				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	62,301	206.4	$926.3	$3,754	$371	$781	$5,832	$0.075	32	39%	212,571,012
3/23/22	4/21/22	48,868	194.3	$726.6	$3,431	$371	$735	$5,264	$0.085	30	35%	166,737,616
4/22/22	5/20/22	44,669	187.0	$666.4	$3,217	$371	$709	$4,964	$0.087	29	34%	152,410,628
5/21/22	6/21/22	48,600	242.1	$730.8	$3,745	$371	$3,148	$7,994	$0.092	32	26%	165,823,200
6/22/22	7/21/22	22,998	102.9	$357.5	$2,123	$371	$1,394	$4,246	$0.108	30	31%	78,469,176
7/22/22	8/19/22	26,373	131.4	$410.0	$2,346	$371	$1,780	$4,907	$0.104	29	29%	89,984,676
8/20/22	9/20/22	43,104	225.7	$670.1	$2,868	$371	$3,058	$6,966	$0.082	32	25%	147,070,848
9/21/22	10/19/22	42,492	210.3	$683.0	$2,614	$371	$939	$4,607	$0.078	29	29%	144,982,704
10/20/22	11/17/22	46,895	187.3	$766.1	$2,790	$371	$837	$4,764	$0.076	29	36%	160,005,740
11/18/22	12/20/22	68,494	188.9	$1,019.0	$4,498	$371	$844	$6,732	$0.081	33	46%	233,701,528
12/21/22	1/21/23	65,060	195.2	$1,062.9	$4,610	$371	$872	$6,916	$0.087	32	43%	221,984,720
1/22/23	2/21/23	63,568	195.8	$1,043.0	$4,499	$371	$875	$6,787	$0.087	31	44%	216,894,016
TOTALS		583,422	242	$9,061	$40,493	$4,450	$15,973	$69,977	$0.085	368	27%	1,990,635,864

Woodrow Wilson Middle School							Natural Gas Meter #1	
Provider	Elizabethtown Gas		Account #	7005665571			Meter #	3204585 - Main Gas
Commodity	Direct Energy		Commodity	777167			Rate Tariff:	General Delivery Service
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
2/28/22	3/31/22	5,092	$2,518	$38	$2,476	$5,031	$0.98	50,715,000
3/31/22	4/30/22	2,115	$1,558	$38	$1,029	$2,624	$1.22	22,704,000
5/1/22	5/31/22	436	$1,017	$38	$212	$1,266	$2.82	17,510,000
6/1/22	6/30/22	207	$941	$38	$101	$1,080	$5.03	18,594,000
7/1/22	7/31/22	165	$927	$38	$81	$1,045	$6.09	25,875,000
8/1/22	8/31/22	155	$923	$38	$75	$1,036	$6.45	34,089,000
9/1/22	9/30/22	248	$1,145	$62	$121	$1,327	$5.10	0
10/1/22	10/31/22	1,437	$1,555	$62	$699	$2,316	$1.57	346,752,000
11/1/22	11/30/22	4,138	$2,482	$62	$2,012	$4,556	$1.09	1,068,110,000
12/1/22	12/31/22	7,152	$3,517	$62	$6,438	$10,017	$1.39	751,512,000
1/1/23	1/31/23	5,755	$3,036	$62	$5,180	$8,277	$1.43	509,167,000
2/1/23	2/28/23	5,574	$3,033	$62	$5,017	$8,112	$1.44	211,548,000
TOTALS		32,474	$22,652	$596	$23,439	$46,687	$1.42	3,056,576,000

Woodrow Wilson Middle School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	0845300000- 87763060							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	106,216	$287	$871	$1,026	$2,183	$0.0179	0
3/17/22	4/19/22	115,940	$287	$951	$1,120	$2,357	$0.0179	0
4/20/22	5/17/22	87,516	$287	$718	$845	$1,850	$0.0179	0
5/18/22	6/16/22	236,368	$287	$1,938	$2,283	$4,508	$0.0179	0
6/17/22	7/19/22	102,476	$287	$840	$990	$2,117	$0.0179	0
7/20/22	8/16/22	92,752	$287	$761	$896	$1,943	$0.0179	0
8/17/22	9/19/22	100,232	$287	$822	$968	$2,077	$0.0179	0
9/20/22	10/18/22	156,332	$287	$1,282	$1,510	$3,078	$0.0179	0
10/19/22	11/17/22	211,684	$287	$1,736	$2,044	$4,067	$0.0179	0
11/18/22	12/16/22	192,236	$287	$1,576	$1,857	$3,719	$0.0179	0
12/17/22	1/19/23	118,932	$296	$1,021	$1,149	$2,466	$0.0182	0
1/20/23	2/16/23	103,972	$303	$925	$1,004	$2,232	$0.0186	0
TOTALS		1,624,656	$3,467	$13,439	$15,691	$32,597	$0.0179	0

Woodrow Wilson Middle School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	5555300000- 05335134 (FPM)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	0	$197	$0	$0	$197	$0.00	0
3/17/22	4/19/22	0	$197	$0	$0	$197	$0.00	0
4/20/22	5/17/22	0	$197	$0	$0	$197	$0.00	0
5/18/22	6/16/22	0	$197	$0	$0	$197	$0.00	0
6/17/22	7/19/22	0	$197	$0	$0	$197	$0.00	0
7/20/22	8/16/22	0	$197	$0	$0	$197	$0.00	0
8/17/22	9/19/22	0	$197	$0	$0	$197	$0.00	0
9/20/22	10/18/22	0	$197	$0	$0	$197	$0.00	0
10/19/22	11/17/22	0	$197	$0	$0	$197	$0.00	0
11/18/22	12/16/22	0	$197	$0	$0	$197	$0.00	0
12/17/22	1/19/23	0	$195	$0	$0	$195	$0.00	0
1/20/23	2/16/23	0	$194	$0	$0	$194	$0.00	0
TOTALS		0	$2,357	$0	$0	$2,357	$0.00	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Benjamin Franklin Elementary School Baseline Energy Use

Benjamin Franklin Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	75 436 304 00				Meter #	278000191 - Main Electric		
Commodity:	Direct Energy			Commodity:	1350518				Rate Tariff:	General Lighting & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/22/22	4/20/22	21,510	100	$478	$1,588	$5	$395	$2,466	$0.096	30	30%	73,392,120
4/21/22	5/19/22	22,605	93	$504	$2,151	$5	$368	$3,027	$0.117	29	35%	77,128,260
5/20/22	6/21/22	21,885	125	$382	$2,082	$5	$1,761	$4,230	$0.113	33	22%	74,671,620
6/22/22	8/18/22	21,120	127	$381	$505	$10	$1,859	$2,755	$0.042	58	12%	72,061,440
8/19/22	9/19/22	20,515	171	$370	$1,522	$5	$2,498	$4,395	$0.092	32	16%	69,997,180
9/20/22	10/18/22	21,000	129	$495	$1,955	$5	$601	$3,056	$0.117	29	23%	71,652,000
10/19/22	11/16/22	19,280	96	$460	$1,999	$5	$445	$2,910	$0.128	29	29%	65,783,360
11/17/22	12/19/22	23,520	84	$561	$1,837	$5	$390	$2,793	$0.102	33	36%	80,250,240
12/20/22	1/20/23	21,840	85	$521	$2,240	$5	$397	$3,163	$0.126	32	33%	74,518,080
1/21/23	2/17/23	22,480	86	$538	$2,320	$5	$403	$3,265	$0.127	28	39%	76,701,760
2/18/23	3/21/23	24,000	87	$575	$2,477	$5	$404	$3,461	$0.127	32	36%	81,888,000
3/22/23								$0	$0.00	(45006)	0%	0
TOTALS		239,755	171	$5,266	$20,677	$59	$9,520	$35,521	$0.108	(44641)	0%	818,044,060

Benjamin Franklin Elementary School						Natural Gas Meter #1		
Provider	PSE&G		Account #	7543630400		Meter #	2283362 - Main Gas	
Commodity	Direct Energy		Commodity	361148		Rate Tariff:	Large Volume Gas	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/22/22	4/20/22	3,268	$535	$164	$1,696	$2,395	$0.68	1,395,503,100
4/21/22	5/19/22	650	$95	$164	$337	$597	$0.67	23,834,500
5/20/22	6/21/22	344	$24	$168	$178	$371	$0.59	251,650,300
6/22/22	8/18/22	146	$11	$341	$73	$425	$0.58	513,873,200
8/19/22	9/19/22	96	$7	$170	$50	$227	$0.59	906,809,900
9/20/22	10/18/22	373	$51	$170	$194	$415	$0.65	0
10/19/22	11/16/22	3,142	$1,007	$170	$1,112	$2,289	$0.67	0
11/17/22	12/19/22	1,057	$1,366	$174	$393	$1,933	$1.66	0
12/20/22	1/20/23	4,862	$1,522	$176	$3,741	$5,439	$1.08	0
1/21/23	2/17/23	818	$779	$173	$752	$1,703	$1.87	0
2/18/23	3/21/23	8,350	$2,225	$176	$7,681	$10,082	$1.19	0
3/22/23						$0	-	0
TOTALS		23,105	$7,622	$2,047	$16,206	$25,875	$1.03	3,091,671,000

Benjamin Franklin Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90067080- 7087126042 / 7103124047 (combined)							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
2/23/22	3/17/22	52,360	$217	$65	$506	$788	$0.0109	0
3/18/22	4/22/22	61,336	$217	$142	$592	$952	$0.0120	0
4/23/22	5/17/22	49,368	$217	$39	$477	$733	$0.0104	0
5/18/22	6/17/22	66,572	$217	$187	$643	$1,048	$0.0125	0
6/18/22	7/21/22	2,992	$217	$0	$29	$246	$0.0097	0
7/22/22	8/18/22	2,992	$217	$0	$29	$246	$0.0097	0
8/19/22	9/20/22	42,636	$217	$0	$412	$629	$0.0097	0
9/21/22	10/21/22	69,564	$217	$213	$672	$1,102	$0.0127	0
10/22/22	11/22/22	71,060	$217	$226	$686	$1,130	$0.0128	0
11/23/22	12/27/22	75,548	$217	$265	$730	$1,212	$0.0132	0
12/28/22	1/26/23	58,344	$217	$117	$563	$897	$0.0117	0
1/27/23	2/24/23	106,964	$217	$536	$1,033	$1,786	$0.0147	0
TOTALS		659,736	$2,609	$1,789	$6,372	$10,769	$0.0124	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

James Madison Intermediate School Baseline Energy Use

James Madison Intermediate School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-016-05				Meter #	5318466 - Addition		
Commodity:	PSEG BGS			Commodity:	on PSEG bill				Rate Tariff:	General Lighting & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	7,600	34.0	$169	$578	$5	$135	$886.81	$0.098	32	29%	25,931,200
3/23/22	4/21/22	5,640	41.6	$125	$519	$5	$165	$813	$0.114	30	19%	19,243,680
4/22/22	5/20/22	6,920	29.6	$154	$588	$5	$117	$864	$0.107	29	34%	23,611,040
5/21/22	6/21/22	320	30.0	$6	$215	$5	$422	$648	$0.690	32	1%	1,091,840
6/22/22	7/22/22	4,640	15.2	$84	$485	$5	$223	$796	$0.122	31	41%	15,831,680
7/23/22	8/19/22	4,480	16.4	$81	$474	$5	$240	$800	$0.124	28	41%	15,285,760
8/20/22	9/20/22	1,440	8.8	$26	$262	$5	$129	$421	$0.200	32	21%	4,913,280
9/21/22	10/19/22	5,120	18.4	$121	$416	$5	$86	$628	$0.105	29	40%	17,469,440
10/20/22	11/17/22	4,720	18.4	$113	$399	$5	$86	$602	$0.108	29	37%	16,104,640
11/18/22	12/20/22	6,280	20.0	$150	$535	$5	$93	$783	$0.109	33	40%	21,427,360
12/21/22	1/23/23	8,120	34.0	$194	$716	$5	$158	$1,073	$0.112	34	29%	27,705,440
1/24/23	2/21/23	11,120	32.8	$247	$981	$5	$130	$1,363	$0.110	29	49%	37,941,440
TOTALS		66,400	42	$1,469	$6,167	$59	$1,983	$9,678	$0.115	368	18%	226,556,800

James Madison Intermediate School							ELECTRIC METER #2					
Provider:	PSEG			Account #	42-609-016-05				Meter #	9207500 - Main		
Commodity:	Direct Energy			Commodity	1152684				Rate Tariff	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	56,014	144	$833	$2,338	$371	$544	$4,085	$0.057	32	51%	191,119,768
3/23/22	4/21/22	42,772	144	$636	$4,046	$371	$544	$5,596	$0.109	30	41%	145,938,064
4/22/22	5/20/22	30,558	115	$456	$2,891	$371	$433	$4,151	$0.110	29	38%	104,263,896
5/21/22	6/21/22	24,016	116	$361	$2,272	$371	$1,512	$4,516	$0.110	32	27%	81,942,592
6/22/22	7/21/22	13,355	66	$208	$1,263	$371	$893	$2,735	$0.110	30	28%	45,567,260
7/22/22	8/19/22	11,670	60	$181	$1,104	$371	$814	$2,470	$0.110	29	28%	39,818,040
8/20/22	9/20/22	21,119	118	$328	$3,331	$371	$1,595	$5,624	$0.173	32	23%	72,058,028
9/21/22	10/19/22	25,562	130	$412	$2,966	$371	$579	$4,328	$0.132	29	28%	87,217,544
10/20/22	11/17/22	31,409	134	$513	$3,362	$371	$600	$4,846	$0.123	29	34%	107,167,508
11/18/22	12/20/22	60,726	142	$1,998	$7,466	$371	$635	$10,471	$0.156	33	54%	207,197,112
12/21/22	1/21/23	57,380	143	$937	$8,264	$371	$637	$10,210	$0.160	32	52%	195,780,560
1/22/23	2/21/23	63,201	159	$1,799	$5,360	$371	$604	$8,134	$0.113	31	53%	215,641,812
TOTALS		437,782	159	$8,663	$44,662	$4,450	$9,390	$67,166	$0.122	368	31%	1,493,712,184

James Madison Intermediate School						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	9010347800		Meter #	3203261 - Main Gas	
Commodity	Direct Energy		Account #	777163		Rate Tariff:	General Delivery Service	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
2/16/22	**3/21/22**	**3,606**	**$1,593**	**$38**	**$1,753**	**$3,383**	**$0.93**	**122,338,000**
3/21/22	**4/19/22**	**2,357**	**$1,137**	**$38**	**$1,146**	**$2,321**	**$0.97**	**8,829,000**
4/20/22	**5/18/22**	**985**	**$681**	**$38**	**$479**	**$1,197**	**$1.18**	**7,046,000**
5/19/22	**6/20/22**	**104**	**$396**	**$38**	**$51**	**$484**	**$4.30**	**6,723,000**
6/21/22	**7/19/22**	**67**	**$384**	**$38**	**$33**	**$455**	**$6.19**	**9,831,000**
7/19/22	**8/19/22**	**70**	**$385**	**$38**	**$34**	**$456**	**$6.02**	**30,691,000**
8/20/22	**9/20/22**	**81**	**$438**	**$53**	**$39**	**$530**	**$5.92**	**213,120,000**
9/21/22	**10/19/22**	**234**	**$520**	**$62**	**$114**	**$696**	**$2.71**	**333,940,000**
10/20/22	**11/16/22**	**766**	**$711**	**$62**	**$372**	**$1,145**	**$1.41**	**412,377,000**
11/17/22	**12/16/22**	**3,301**	**$1,631**	**$62**	**$2,334**	**$4,026**	**$1.20**	**397,717,000**
12/17/22	**1/21/21**	**4,079**	**$1,998**	**$74**	**$3,676**	**$5,748**	**$1.39**	**360,636,000**
1/22/21	**2/16/23**	**3,024**	**$1,550**	**$62**	**$2,725**	**$4,337**	**$1.41**	**235,679,000**
TOTALS		**18,672**	**$11,424**	**$599**	**$12,755**	**$24,778**	**$1.29**	**2,138,927,000**

James Madison Intermediate School								
Provider	NJ American Water (combined)			Water & Sewer (Gal)				
Acct #	1018- 210018968485- 72028402C/72028402D							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/25/22	3/29/22	154,000	$925	$1,248	$1,487	$3,660	$0.0178	0
3/30/22	4/27/22	142,000	$925	$1,153	$1,371	$3,449	$0.0178	0
4/28/22	5/26/22	133,000	$925	$1,100	$1,285	$3,309	$0.0179	0
5/27/22	6/28/22	112,000	$925	$989	$1,082	$2,996	$0.0185	0
6/29/22	7/28/22	57,000	$925	$585	$551	$2,060	$0.0199	0
7/29/22	8/26/22	27,000	$925	$364	$261	$1,550	$0.0232	0
8/27/22	9/28/22	152,000	$982	$1,247	$1,468	$3,697	$0.0179	0
9/29/22	10/27/22	157,000	$993	$1,293	$1,516	$3,802	$0.0179	0
10/28/22	11/23/22	108,000	$993	$889	$1,043	$2,925	$0.0179	0
11/24/22	12/28/22	127,000	$925	$993	$1,227	$3,144	$0.0175	0
12/29/22	1/27/23	151,000	$993	$1,244	$1,458	$3,694	$0.0179	0
1/28/23	2/25/23	154,000	$993	$1,280	$1,487	$3,759	$0.0180	0
TOTALS		1,474,000	$11,427	$12,384	$14,236	$38,048	$0.0181	0

James Madison Primary School Baseline Energy Use

James Madison Primary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-314-07				Meter #	278002299 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	23,070	74.70	$513	$2,182	$5	$296	$2,996	$0.117	32	40%	78,714,840
3/23/22	4/21/22	21,480	76.80	$478	$2,032	$5	$304	$2,818	$0.117	30	39%	73,289,760
4/22/22	5/20/22	19,350	85.20	$431	$1,830	$5	$337	$2,604	$0.117	29	33%	66,022,200
5/21/22	6/21/22	32,340	100.50	$565	$3,059	$5	$1,415	$5,044	$0.112	32	42%	110,344,080
6/22/22	7/21/22	18,960	87.60	$342	$1,794	$5	$1,283	$3,423	$0.113	30	30%	64,691,520
7/22/22	8/19/22	7,200	51.00	$130	$681	$5	$747	$1,563	$0.113	29	20%	24,566,400
8/20/22	9/20/22	36,330	107.40	$655	$6,588	$5	$1,572	$8,821	$0.199	32	44%	123,957,960
9/21/22	10/19/22	22,140	75.90	$523	$3,413	$5	$354	$4,295	$0.178	29	42%	75,541,680
10/20/22	11/17/22	23,250	75.90	$555	$3,338	$5	$354	$4,252	$0.167	29	44%	79,329,000
11/18/22	12/20/22	27,510	74.70	$657	$4,468	$5	$348	$5,478	$0.186	33	46%	93,864,120
12/21/22	1/23/23	28,950	74.70	$691	$5,103	$5	$348	$6,147	$0.200	34	47%	98,777,400
1/24/23	2/21/23	47,070	108.30	$1,127	$5,287	$5	$505	$6,924	$0.136	29	62%	160,602,840
TOTALS		307,650	108	$6,666	$39,775	$59	$7,861	$54,361	$0.151	368	32%	1,049,701,800

James Madison Primary School						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	9051585980		Meter #	2523650 - Main Gas	
Commodity	Direct Energy		Commodity	777160		Rate Tariff:	General Delivery Service	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
#VALUE!	3/21/22	4,013	$1,730	$38	$1,951	$3,718	$0.92	12,912,000
3/22/22	4/19/22	2,666	$1,238	$38	$1,296	$2,572	$0.95	10,569,000
4/20/22	5/18/22	1,384	$809	$38	$673	$1,520	$1.07	10,029,000
5/19/22	6/20/22	90	$391	$38	$44	$472	$4.85	12,040,000
6/21/22	7/19/22	24	$102	$38	$11	$152	$4.84	34,334,000
7/19/22	8/19/22	22	$370	$38	$11	$418	$17.24	277,474,000
8/20/22	9/20/22	45	$426	$53	$23	$501	$9.99	405,223,000
9/21/22	10/19/22	608	$647	$62	$296	$1,005	$1.55	536,721,000
10/20/22	11/16/22	1,633	$1,016	$62	$794	$1,871	$1.11	517,952,000
11/17/22	12/16/22	3,725	$1,782	$62	$2,634	$4,478	$1.19	401,297,000
12/17/22	1/21/23	4,733	$2,233	$74	$4,266	$6,573	$1.37	266,579,000
1/22/23	2/16/23	3,224	$1,622	$62	$2,906	$4,590	$1.40	138,440,000
TOTALS		22,167	$12,365	$600	$14,904	$27,869	$1.23	2,623,570,000

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100 Lenox Drive
Lawrenceville, NJ 08648

James Monroe Elementary School Baseline Energy Use

James Monroe Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-024-07				Meter #	9204319 - Main Electric		
Commodity:	PSEG BGS			Commodity:	on PSEG bill				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	36,275	105.3	$539	$3,554	$371	$399	$4,862	$0.113	32	45%	123,770,300
3/23/22	4/21/22	34,731	171.2	$516	$3,695	$371	$648	$5,230	$0.121	30	28%	118,502,172
4/22/22	5/20/22	36,035	170.3	$538	$3,770	$371	$645	$5,323	$0.120	29	30%	122,951,420
5/21/22	6/21/22	51,223	229.1	$772	$4,395	$371	$2,979	$8,516	$0.101	32	29%	174,772,876
6/22/22	7/21/22	48,238	219.8	$750	$4,035	$371	$2,978	$8,133	$0.099	30	30%	164,588,056
7/22/22	8/19/22	48,744	217.4	$758	$4,066	$371	$2,945	$8,140	$0.099	29	32%	166,314,528
8/20/22	9/20/22	52,269	222.2	$813	$3,645	$371	$3,010	$7,838	$0.085	32	31%	178,341,828
9/21/22	10/22/22	35,431	191.3	$568	$2,463	$371	$855	$4,256	$0.086	32	24%	120,890,572
10/23/22	11/17/22	35,295	181.9	$577	$2,442	$371	$813	$4,202	$0.086	26	31%	120,426,540
11/18/22	12/20/22	39,010	121.1	$637	$3,022	$371	$541	$4,571	$0.094	33	41%	133,102,120
12/21/22	1/21/23	36,316	107.9	$593	$3,688	$371	$482	$5,135	$0.118	32	44%	123,910,192
1/22/23	2/21/23	36,635	127.4	$601	$4,052	$371	$569	$5,593	$0.127	31	39%	124,998,620
TOTALS		490,202	229	$7,661	$42,826	$4,450	$16,864	$71,801	$0.103	368	24%	1,672,569,224

James Monroe Elementary School						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	5681436103			Meter #	2302910 -Main Gas
Commodity	Elizabethtown Gas BGSS		Commodity	on Elizabethdown Gas bill			Rate Tariff:	General Delivery Service
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
2/28/22	3/31/22	2,464	$1,400	$38	$1,722	$3,159	$1.27	56,925,000
3/31/22	4/30/22	1,390	$1,064	$38	$1,098	$2,200	$1.56	15,480,000
5/1/22	5/31/22	446	$762	$38	$446	$1,245	$2.71	18,540,000
6/1/22	6/30/22	72	$641	$38	$85	$764	$10.03	11,363,000
7/1/22	7/31/22	52	$635	$38	$48	$720	$13.23	36,225,000
8/1/22	8/31/22	41	$631	$38	$48	$717	$16.44	68,178,000
9/1/22	9/30/22	186	$812	$62	$215	$1,088	$5.52	276,308,000
10/1/22	10/31/22	910	$1,059	$62	$892	$2,013	$2.14	292,056,000
11/1/22	11/30/22	2,208	$1,501	$62	$1,762	$3,325	$1.48	481,168,000
12/1/22	12/31/22	3,519	$2,000	$62	$2,808	$4,870	$1.37	344,616,000
1/1/23	1/31/23	2,981	$1,816	$62	$2,224	$4,102	$1.36	246,395,000
2/1/23	2/28/23	2,771	$1,774	$62	$1,587	$3,423	$1.21	138,958,000
TOTALS		17,040	$14,094	$596	$12,935	$27,625	$1.59	1,986,212,000

James Monroe Elementary School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	3195185466- 81787964							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
2/16/22	3/15/22	31,416	$478	$258	$303	$1,039	$0.0179	0
3/16/22	4/18/22	36,652	$478	$301	$354	$1,132	$0.0179	0
4/19/22	5/16/22	24,684	$478	$202	$238	$919	$0.0179	0
5/17/22	6/15/22	41,888	$478	$343	$405	$1,226	$0.0179	0
6/16/22	7/18/22	10,472	$478	$86	$101	$665	$0.0179	0
7/19/22	8/15/22	5,984	$478	$49	$58	$585	$0.0179	0
8/16/22	9/16/22	72,556	$478	$595	$701	$1,774	$0.0179	0
9/17/22	10/17/22	36,652	$478	$301	$354	$1,132	$0.0179	0
10/18/22	11/16/22	29,920	$478	$245	$289	$1,012	$0.0179	0
11/17/22	12/15/22	29,172	$478	$239	$282	$999	$0.0179	0
12/16/22	1/18/23	26,928	$492	$231	$260	$983	$0.0182	0
1/19/23	2/15/23	32,912	$505	$293	$318	$1,116	$0.0186	0
TOTALS		379,236	$5,777	$3,142	$3,663	$12,582	$0.0179	0

James Monroe Elementary School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	2744197949-00001092 (FPM)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/16/22	3/15/22	0	$400	$0	$0	$400	$0.00	0
3/16/22	4/18/22	0	$400	$0	$0	$400	$0.00	0
4/19/22	5/16/22	0	$400	$0	$0	$400	$0.00	0
5/17/22	6/15/22	0	$400	$0	$0	$400	$0.00	0
6/16/22	7/18/22	0	$400	$0	$0	$400	$0.00	0
7/19/22	8/15/22	0	$400	$0	$0	$400	$0.00	0
8/16/22	9/16/22	0	$400	$0	$0	$400	$0.00	0
9/17/22	10/17/22	0	$400	$0	$0	$400	$0.00	0
10/18/22	11/16/22	0	$400	$0	$0	$400	$0.00	0
11/17/22	12/15/22	0	$400	$0	$0	$400	$0.00	0
12/16/22	1/18/23	0	$397	$0	$0	$397	$0.00	0
1/19/23	2/15/22	0	$394	$0	$0	$394	$0.00	0
TOTALS		0	$4,791	$0	$0	$4,791	$0.00	0

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John Marshall Elementary School Baseline Energy Use

John Marshall Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-021-05				Meter #	9207334 - Main Electric		
Commodity:	Direct Energy			Commodity:	on PSEG bill				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/22/22	4/20/22	40,391	129.30	$601	$6,242	$371	$489	$7,703	$0.169	30	43%	137,814,092
4/21/22	5/19/22	35,209	123.80	$525	$6,098	$371	$469	$7,463	$0.188	29	41%	120,133,108
5/20/22	6/20/22	34,456	136.20	$518	$5,957	$371	$1,768	$8,614	$0.188	32	33%	117,563,872
6/21/22	7/20/22	18,631	76.90	$290	$3,061	$371	$1,042	$4,763	$0.180	30	34%	63,568,972
7/21/22	8/18/22	17,037	64.20	$265	$3,406	$371	$870	$4,912	$0.215	29	38%	58,130,244
8/19/22	9/19/22	28,807	136.80	$448	$5,557	$371	$1,853	$8,229	$0.208	32	27%	98,289,484
9/20/22	10/18/22	30,597	130.40	$491	$5,902	$371	$583	$7,347	$0.209	29	34%	104,396,964
10/19/22	11/16/22	34,127	118.80	$558	$10,390	$371	$531	$11,849	$0.321	29	41%	116,441,324
11/17/22	12/19/22	49,532	123.20	$806	$7,604	$371	$550	$9,332	$0.170	33	51%	169,003,184
12/20/22	1/20/23	45,921	120.70	$750	$6,659	$371	$539	$8,319	$0.161	32	50%	156,682,452
1/21/23	2/17/23	42,617	121.90	$699	$5,833	$371	$545	$7,447	$0.153	28	52%	145,409,204
2/18/23	3/18/23	46,742	119.90	$769	$5,881	$371	$536	$7,556	$0.142	29	56%	159,483,704
TOTALS		424,067	137	$6,719	$72,589	$4,450	$9,774	$93,532	$0.187	362	36%	1,446,916,604

John Marshall Elementary School						Natural Gas Meter #1		
Provider	PSEG		Account #	4260902105			Meter #	4950552 - Main Gas
Commodity	Direct Energy		Commodity	361154			Rate Tariff:	Large Volume Gas
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/19/22	4/19/22	2,271	$358	$164	$1,178	$1,701	$0.68	78,317,900
4/20/22	5/19/22	714	$98	$164	$371	$633	$0.66	24,067,400
5/20/22	6/17/22	245	$17	$168	$127	$312	$0.59	20,554,400
6/18/22	7/19/22	211	$16	$170	$103	$289	$0.56	19,321,100
7/20/22	8/17/22	184	$14	$170	$95	$279	$0.59	24,485,900
8/18/22	9/19/22	235	$18	$170	$122	$310	$0.59	28,748,400
9/20/22	10/17/22	406	$50	$170	$210	$431	$0.64	221,090,500
10/18/22	11/15/22	968	$1,089	$170	$502	$1,762	$1.64	434,773,100
11/16/22	12/16/22	3,906	$1,638	$173	$2,027	$3,838	$0.94	528,540,700
12/17/22	1/19/23	4,526	$1,760	$176	$3,362	$5,299	$1.13	582,508,800
1/20/23	2/17/23	3,614	$1,261	$176	$3,325	$4,762	$1.27	393,581,400
2/18/23	3/20/23	4,040	$1,314	$176	$3,716	$5,206	$1.25	227,090,400
TOTALS		21,320	$7,634	$2,049	$15,139	$24,822	$1.07	2,583,080,000

John Marshall Elementary School						Natural Gas Meter #2		
Provider	PSEG		Account #	7543630508			Meter #	3165965 - Addition
Commodity	Direct Energy		Commodity	613491			Rate Tariff	General Service Gas
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**Cost / Unit Checksum**	**BTU**
3/22/22	4/20/22	764	$324	$19	$397	$720	$0.94	25,581,700
4/21/22	5/19/22	243	$103	$19	$126	$229	$0.94	3,243,900
5/20/22	6/18/22	4	$1	$19	$2	$4	$0.86	0
6/19/22	7/20/22	3	$1	$19	$2	$3	$0.84	1,148,800
7/21/22	8/18/22	2	$1	$19	$1	$2	$0.86	0
8/19/22	9/19/22	4	$1	$19	$3	$4	$1.01	627,200
9/20/22	10/18/22	136	$64	$19	$71	$134	$0.99	60,306,900
10/19/22	11/16/22	344	$164	$19	$71	$234	$0.68	119,048,700
11/17/22	12/19/22	1,387	$666	$19	$179	$845	$0.61	226,442,700
12/20/22	1/20/23	1,467	$708	$19	$720	$1,428	$0.97	202,137,700
1/21/23	2/17/23	1,219	$589	$19	$1,122	$1,711	$1.40	131,892,700
2/18/23	3/21/23	1,227	$592	$19	$1,128	$1,721	$1.40	76,430,700
TOTALS		6,801	$3,215	$229	$3,819	$7,034	$1.03	846,861,000

John Marshall Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90022001- 00117134 / 70117134 (combined)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/19/22	3/17/22	55,352	$217	$90	$535	$842	$0.0113	0
3/18/22	4/21/21	59,840	$217	$129	$578	$924	$0.0118	0
4/22/21	5/17/22	47,872	$217	$26	$462	$706	$0.0102	0
5/18/22	6/15/22	61,336	$217	$142	$592	$952	$0.0120	0
6/16/22	7/25/22	88,264	$217	$375	$852	$1,444	$0.0139	0
7/26/22	8/15/22	74,052	$217	$252	$715	$1,184	$0.0131	0
8/16/22	9/19/22	77,792	$217	$284	$751	$1,253	$0.0133	0
9/20/22	10/19/22	651,369	$217	$392	$6,291	$6,900	$0.0103	0
10/20/22	11/21/22	65,824	$217	$181	$636	$1,034	$0.0124	0
11/22/22	12/21/22	65,076	$217	$174	$629	$1,020	$0.0123	0
12/22/22	1/26/23	73,304	$217	$245	$708	$1,171	$0.0130	0
1/27/23	2/21/23	47,124	$217	$19	$455	$692	$0.0101	0
TOTALS		1,320,081	$2,609	$2,309	$13,204	$18,123	$0.0118	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Lincoln Elementary School Baseline Energy Use

Lincoln Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-307-02/47-739-014-04				Meter #	9195514 - Main Electric		
Commodity:	Direct Energy			Commodity:	1350517				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/21/22	4/20/22	19,520	78.4	$434	$1,860	$5	$310	$2,609	$0.118	31	33%	66,602,240
4/21/22	5/19/22	21,040	84.8	$469	$2,003	$5	$335	$2,812	$0.117	29	36%	71,788,480
5/20/22	6/18/22	24,080	116.8	$419	$1,513	$5	$1,637	$3,575	$0.080	30	29%	82,160,960
6/19/22	7/20/22	15,840	108.8	$286	$817	$5	$1,593	$2,700	$0.070	32	19%	54,046,080
7/21/22	8/18/22	8,480	32.8	$153	$1,664	$5	$480	$2,303	$0.214	29	37%	28,933,760
8/19/22	9/19/22	17,440	100.8	$314	$805	$5	$1,476	$2,600	$0.064	32	23%	59,505,280
9/20/22	10/18/22	27,052	45.1	$436	$3,287	$309	$168	$4,200	$0.138	29	86%	92,301,424
10/19/22	11/16/22	31,381	45.1	$513	$3,911	$371	$202	$4,996	$0.141	29	100%	107,071,972
11/17/22	12/19/22	35,710	45.1	$583	$4,453	$371	$202	$5,609	$0.141	33	100%	121,842,520
12/20/22	1/20/23	34,627	45.1	$566	$4,655	$371	$202	$5,793	$0.151	32	100%	118,147,324
1/21/23	2/17/23	37,929	116.3	$622	$4,935	$371	$520	$6,448	$0.147	28	49%	129,413,748
2/18/23	3/21/23	44,951	114.8	$739	$5,497	$371	$513	$7,120	$0.139	32	51%	153,372,812
TOTALS		318,050	117	$5,534	$35,401	$2,193	$7,637	$50,764	$0.129	366	31%	1,085,186,600

Lincoln Elementary School						Natural Gas Meter #1		
Provider	PSEG		Account #	7543630702		Meter #	4743683 - Main Gas	
Commodity	PSEG BGSS		Commodity	on PSEG bill		Rate Tariff:	Large Volume Gas	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
7/20/21	8/18/21	127	$8	$158	$82	$248	$0.71	130,161,500
8/19/21	9/20/21	161	$10	$158	$111	$279	$0.75	14,959,736
9/21/21	10/19/21	429	$57	$158	$361	$575	$0.97	13,363,600
10/20/21	11/18/21	6,238	$2,633	$158	$5,643	$8,434	$1.33	12,672,500
11/19/21	12/17/21	10,580	$3,396	$161	$9,198	$12,756	$1.19	16,106,500
12/18/21	1/20/22	14,532	$4,134	$164	$10,635	$14,933	$1.02	42,870,000
1/21/22	2/16/22	13,102	$4,351	$164	$10,730	$15,246	$1.15	623,752,600
2/17/22	3/18/22	14,158	$4,702	$164	$11,594	$16,460	$1.15	1,057,952,900
3/19/22	4/20/22	9,677	$1,617	$164	$7,520	$9,301	$0.94	1,453,230,900
4/21/22	5/19/22	2,005	$323	$164	$1,826	$2,313	$1.07	1,310,213,800
5/20/22	6/17/22	181	$13	$168	$206	$386	$1.21	1,415,756,471
6/18/22	7/19/22	31	$2	$170	$32	$205	$1.13	967,671,100
TOTALS		71,219	$21,247	$1,951	$57,938	$81,136	$1.11	7,058,711,607

Lincoln Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90220410- 60781878							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
2/24/22	3/18/22	74,800	$104	$473	$722	$1,300	$0.0160	0
3/19/22	4/25/22	97,988	$104	$673	$946	$1,724	$0.0165	0
4/26/22	5/20/22	78,540	$104	$506	$759	$1,369	$0.0161	0
5/21/22	7/28/22	65,824	$104	$396	$636	$1,136	$0.0157	0
7/29/22	8/22/22	102,476	$104	$712	$990	$1,806	$0.0166	0
8/23/22	9/21/22	77,044	$104	$493	$744	$1,341	$0.0161	0
9/22/22	10/25/22	113,696	$104	$809	$1,098	$2,012	$0.0168	0
10/26/22	11/28/22	100,980	$104	$699	$975	$1,779	$0.0166	0
11/29/22	12/15/22	100,980	$104	$699	$975	$1,779	$0.0166	0
12/16/22	1/31/23	142,120	$104	$1,054	$1,373	$2,531	$0.0171	0
2/1/23	2/23/23	83,776	$104	$551	$809	$1,464	$0.0162	0
2/24/23						$0	$0.00	0
TOTALS		1,038,224	$1,149	$7,066	$10,027	$18,242	$0.0165	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Lindeneau Elementary School Baseline Energy Use

Lindeneau Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-316-01				Meter #	9201209 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/22/22	4/20/22	18,760	77.20	$417	$1,775	$5	$305	$2,502	$0.117	30	34%	64,009,120
4/21/22	5/19/22	14,160	68.80	$316	$1,339	$5	$272	$1,932	$0.117	29	30%	48,313,920
5/20/22	6/18/22	17,840	82.00	$310	$1,688	$5	$1,149	$3,152	$0.112	30	30%	60,870,080
6/19/22	7/20/22	10,040	66.80	$181	$950	$5	$978	$2,114	$0.113	32	20%	34,256,480
7/21/22	8/18/22	7,520	31.60	$136	$711	$5	$463	$1,315	$0.113	29	34%	25,658,240
8/19/22	10/18/22	29,520	164.00	$620	$5,497	$10	$1,583	$7,710	$0.207	61	12%	100,722,240
10/19/22	11/16/22	17,200	72.40	$411	$2,510	$5	$337	$3,263	$0.170	29	34%	58,686,400
11/17/22	12/19/22	18,400	82.00	$439	$3,103	$5	$382	$3,929	$0.192	33	28%	62,780,800
12/20/22	1/20/23	18,880	65.20	$450	$3,518	$5	$304	$4,277	$0.210	32	38%	64,418,560
1/21/23	2/17/23	21,160	76.40	$507	$2,764	$5	$356	$3,632	$0.155	28	41%	72,197,920
2/18/23								$0	$0.00	(44974)	-	0
1/1/00								$0	$0.00	0	-	0
TOTALS		173,480	164	$3,787	$23,855	$54	$6,130	$33,825	$0.159	(44641)	0%	591,913,760

Lindeneau Elementary School						Natural Gas Meter #1		
Provider	PSEG		Account #	7543630303		Meter #	1639176 - Main Gas	
Commodity	Direct Energy		Commodity	361152		Rate Tariff:	Large Volume Gas	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/19/22	4/19/02	2,153	$352	$164	$1,117	$1,634	$0.68	87,082,100
4/20/02	5/19/22	678	$105	$164	$352	$621	$0.67	28,464,300
5/20/22	6/17/22	0	$0	$168	$0	$168	-	0
6/18/22	7/19/22	0	$0	$170	$0	$170	-	0
7/20/22	8/17/22	0	$0	$170	$0	$170	-	213,800
8/18/22	9/16/22	0	$0	$170	$0	$170	-	1,602,000
9/17/22	10/17/22	321	$56	$170	$167	$393	$0.69	185,688,600
10/18/22	11/15/22	798	$965	$170	$414	$1,549	$1.73	357,946,300
11/16/22	12/16/22	4,043	$1,569	$173	$2,098	$3,840	$0.91	479,577,000
12/17/22	1/19/23	4,581	$1,677	$176	$3,403	$5,256	$1.11	492,608,300
1/20/23	2/16/23	3,935	$1,364	$176	$3,620	$5,159	$1.27	368,144,100
2/17/23	3/20/23	4,120	$1,398	$176	$3,790	$5,364	$1.26	215,295,200
TOTALS		20,630	$7,485	$2,049	$14,961	$24,495	$1.09	2,216,621,700

Lindeneau Elementary School						Natural Gas Meter #2		
Provider	PSEG		Account #	7543631601		Meter #	4945028 - Addition	
Commodity	Direct Energy		Commodity	361151		Rate Tariff	General Service Gas	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**Cost / Unit Checksum**	**BTU**
3/18/22	4/19/22	77	$28	$19	$36	$65	$0.84	7,339,000
4/20/22	5/20/22	70	$26	$19		$26	$0.36	5,965,900
5/21/22	6/17/22	55	$19	$19	$29	$48	$0.86	3,443,100
6/18/22	7/19/22	38	$14	$19	$18	$32	$0.86	3,655,300
7/20/22	8/18/22	31	$12	$19	$16	$28	$0.89	5,336,700
8/19/22	10/17/22	103	$59	$19	$54	$113	$1.10	5,749,700
10/18/22	11/16/22	62	$26	$19	$32	$58	$0.94	5,947,200
11/17/22	12/16/22	68	$29	$19	$35	$65	$0.95	6,468,900
12/17/22	1/19/23	80	$35	$19	$59	$94	$1.18	7,324,900
1/20/23	2/17/23	72	$32	$19	$66	$98	$1.36	7,129,300
2/18/23	3/20/23	75	$33	$19	$68	$101	$1.35	7,024,500
3/21/23						$0	-	7,653,600
TOTALS		731	$314	$204	$414	$728	$1.00	73,038,100

Lindeneau Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90037900- 00110186 / 70110186 (combined)							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
2/23/22	3/18/22	29,920	$217	$0	$289	$506	$0.0097	0
3/19/22	4/21/22	34,408	$217	$0	$332	$550	$0.0097	0
4/22/22	5/18/22	27,676	$217	$0	$267	$485	$0.0097	0
5/19/22	6/15/22	35,156	$217	$0	$340	$557	$0.0097	0
6/16/22	7/25/22	8,976	$217	$0	$87	$304	$0.0097	0
7/26/22	8/16/22	2,244	$217	$0	$22	$239	$0.0097	0
8/17/22	9/20/22	25,432	$217	$0	$246	$463	$0.0097	0
9/21/22	10/19/22	24,684	$217	$0	$238	$456	$0.0097	0
10/20/22	11/21/22	47,872	$217	$26	$462	$706	$0.0102	0
11/22/22	12/19/22	26,928	$217	$0	$260	$477	$0.0097	0
12/20/22	1/27/23	43,384	$217	$0	$419	$636	$0.0097	0
1/28/23	2/22/23	30,668	$217	$0	$296	$514	$0.0097	0
TOTALS		306,680	$2,609	$26	$3,258	$5,893	$0.0107	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Martin Luther King Elementary School Baseline Energy Use

Martin Luther King Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-310-08				Meter #	278006829 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	28,215	115.7	$627	$2,669	$4.84	$458	$3,759	$0.117	32	32%	96,269,580
3/23/22	4/21/22	17,730	73.8	$394	$1,677	$4.84	$292	$2,368	$0.117	30	33%	60,494,760
4/22/22	5/20/22	17,910	82.4	$399	$1,694	$4.84	$326	$2,424	$0.117	29	31%	61,108,920
5/21/22	6/21/22	27,450	96.8	$479	$2,597	$4.91	$1,363	$4,444	$0.112	32	37%	93,659,400
6/22/22	7/21/22	20,025	96.3	$361	$1,894	$4.95	$1,410	$3,670	$0.113	30	29%	68,325,300
7/22/22	8/19/22	9,720	95.9	$175	$919	$4.95	$1,404	$2,504	$0.113	29	15%	33,164,640
8/20/22	9/20/22	40,185	126.9	$725	$7,427	$4.95	$1,858	$10,015	$0.203	32	41%	137,111,220
9/21/22	10/19/22	26,370	115.7	$622	$4,100	$4.95	$539	$5,266	$0.179	29	33%	89,974,440
10/20/22	11/17/22	25,290	115.7	$604	$3,777	$4.95	$539	$4,925	$0.173	29	31%	86,289,480
11/18/22	12/20/22	28,755	115.7	$686	$4,889	$4.95	$539	$6,119	$0.194	33	31%	98,112,060
12/21/22	1/23/23	27,495	73.8	$656	$5,103	$4.95	$344	$6,108	$0.209	34	46%	93,812,940
1/24/23	2/21/23	25,380	111.2	$608	$3,679	$4.95	$518	$4,810	$0.169	29	33%	86,596,560
TOTALS		294,525	127	$6,337	$40,426	$59	$9,590	$56,412	$0.159	368	26%	1,004,919,300

Martin Luther King Elementary School							Natural Gas Meter #1	
Provider	Elizabethtown Gas		Account #	0758783541			Meter #	2523682 - Main Gas
Commodity	Direct Energy		Account #	777158			Meter #	General Delivery Service
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
2/16/22	3/21/22	4,833	$1,945	$38	$2,349	$4,332	$0.89	65,372,000
3/21/22	4/19/22	3,309	$1,385	$38	$1,609	$3,032	$0.90	8,939,000
4/20/22	5/18/22	1,792	$876	$38	$871	$1,785	$0.98	7,926,000
5/19/22	6/20/22	111	$333	$38	$54	$424	$3.50	7,274,000
6/21/22	7/19/22	74	$330	$38	$35	$403	$4.95	8,616,000
7/19/22	8/19/22	73	$321	$38	$35	$394	$4.89	13,910,000
8/20/22	9/20/22	87	$366	$53	$42	$461	$4.69	154,936,000
9/21/22	10/19/22	168	$419	$62	$82	$562	$2.98	324,135,000
10/20/22	11/16/22	695	$607	$62	$338	$1,007	$1.36	609,227,000
11/17/22	12/16/22	4,670	$2,045	$62	$3,302	$5,409	$1.14	558,954,000
12/17/22	1/21/23	5,400	$2,379	$74	$4,867	$7,320	$1.34	483,285,000
1/22/23	2/16/23	3,618	$1,688	$62	$3,260	$5,010	$1.37	330,926,000
TOTALS		24,829	$12,694	$600	$16,845	$30,140	$1.19	2,573,500,000

Martin Luther King Elementary School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	8054300000-19333708							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
1/21/22	4/21/22	154,836	$860	$1,269	$1,495	$3,625	$0.0179	0
4/22/22	7/21/22	103,972	$861	$852	$1,004	$2,718	$0.0179	0
7/22/22	10/20/22	91,256	$860	$748	$881	$2,490	$0.0179	0
10/21/22	1/20/23	124,168	$871	$1,037	$1,199	$3,107	$0.0180	0
1/21/23						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
TOTALS		474,232	$3,453	$3,907	$4,580	$11,940	$0.0179	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Washington Elementary School Baseline Energy Use

Washington Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-017-02				Meter #	778018475 - Addition		
Commodity:	Direct Energy			Commodity:	1350516				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/18/22	3/21/22	26,640	86.40	$396	$2,530	$371	$327	$3,624	$0.110	32	40%	90,895,680
3/22/22	5/19/22	32,320	122.40	$481	$3,070	$742	$927	$5,220	$0.110	59	19%	110,275,840
5/20/22	8/18/22	37,920	71.20	$583	$3,624	$1,112	$2,851	$8,170	$0.111	91	24%	129,383,040
8/19/22	9/19/22	12,640	62.40	$196	$1,208	$371	$845	$2,621	$0.111	32	26%	43,127,680
9/20/22	11/16/22	21,680	60.80	$351	$2,075	$742	$543	$3,711	$0.112	58	26%	73,972,160
11/17/22	12/19/22	22,000	72.80	$359	$2,093	$371	$325	$3,148	$0.111	33	38%	75,064,000
12/20/22	1/20/23	24,480	75.20	$400	$2,329	$371	$336	$3,436	$0.111	32	42%	83,525,760
1/21/23	3/21/23	42,000	76.00	$690	$3,995	$742	$679	$6,106	$0.112	60	38%	143,304,000
3/22/23								$0	$0.00	(45006)	-	0
1/1/00								$0	$0.00	0	-	0
1/1/00								$0	$0.00	0	-	0
1/1/00								$0	$0.00	0	-	0
TOTALS		219,680	122	$3,457	$20,924	$4,821	$6,834	$36,035	$0.111	(44609)	0%	749,548,160

Washington Elementary School							ELECTRIC METER #2					
Provider:	PSEG			Account #	75-436-306-05				Meter #	9193437 - Main		
Commodity:	Direct Energy			Commodity:	1350520				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/22/22	4/20/22	6,880	48	$153	$1,193	$5	$190	$1,541	$0.196	30	20%	23,474,560
4/21/22	5/19/22	14,880	61	$332	$1,628	$5	$241	$2,205	$0.132	29	35%	50,770,560
5/20/22	6/19/22	12,080	66	$210	$1,529	$5	$931	$2,675	$0.144	31	24%	41,216,960
6/20/22	7/20/22	10,320	56	$186	$1,451	$5	$820	$2,462	$0.159	31	25%	35,211,840
7/21/22	8/18/22	9,600	72	$173	$1,405	$5	$1,054	$2,637	$0.164	29	19%	32,755,200
8/19/22	9/20/22	15,200	70	$274	$1,589	$5	$1,019	$2,887	$0.123	33	28%	51,862,400
9/21/22	11/16/22	23,040	139	$546	$2,611	$10	$649	$3,816	$0.137	57	12%	78,612,480
11/17/22	12/19/22	13,360	62	$319	$1,522	$5	$291	$2,137	$0.138	33	27%	45,584,320
12/20/22	1/20/23	12,080	64	$288	$1,376	$5	$298	$1,968	$0.138	32	25%	41,216,960
1/21/23	3/21/23	25,920	118	$621	$2,953	$10	$552	$4,136	$0.138	60	15%	88,439,040
3/22/23								$0	$0.00	(45006)	0%	0
1/1/00								$0	$0.00	0	0%	0
TOTALS		143,360	139	$3,102	$17,259	$59	$6,044	$26,464	$0.142	(44641)	0%	489,144,320

Washington Elementary School						Natural Gas Meter #1		
Provider	PSEG		Account #	7543630605			Meter #	2642185 - Main Gas
Commodity			Commodity				Rate Tariff:	Large Volume Gas
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
3/21/22	4/20/22	2,427	$386	$164	$1,892	$2,442	$0.94	120,072,100
4/21/22	5/19/22	908	$131	$164	$833	$1,128	$1.06	22,090,400
5/20/22	6/18/22	180	$13	$168	$205	$385	$1.21	20,374,300
6/19/22	7/20/22	88	$7	$170	$93	$270	$1.13	19,842,900
7/21/22	8/18/22	158	$12	$170	$173	$355	$1.17	21,759,000
8/19/22	9/19/22	185	$14	$170	$228	$412	$1.30	26,372,500
9/20/22	11/16/22	1,527	$1,335	$341	$1,489	$3,165	$1.85	250,328,700
11/17/22	12/19/22	4,723	$1,954	$174	$4,358	$6,485	$1.34	661,779,700
12/20/22	1/20/23	5,287	$2,069	$176	$4,674	$6,920	$1.28	872,569,900
1/21/23	3/21/23	9,253	$3,217	$352	$5,660	$9,229	$0.96	679,154,300
3/22/23						$0	-	588,519,200
3/21/22						$0	-	242,689,500
TOTALS		24,736	$9,138	$2,049	$19,603	$30,791	$1.16	3,525,552,500

Washington Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90235471-7087126060 / 7093121404 (combined)							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
2/25/22	3/11/21	4,488	$217	$0	$43	$261	$0.0097	0
3/12/21	4/24/21	16,456	$217	$0	$159	$376	$0.0097	0
4/25/21	5/20/22	7,480	$217	$0	$72	$290	$0.0097	0
5/21/22	6/21/22	9,724	$217	$0	$94	$311	$0.0097	0
6/22/22	7/29/22	1,496	$217	$0	$14	$232	$0.0097	0
7/30/22	8/19/22	0	$217	$0	$0	$217	$0.00	0
8/20/22	9/26/22	5,984	$217	$0	$58	$275	$0.0097	0
9/27/22	10/28/22	6,732	$217	$0	$65	$282	$0.0097	0
10/29/22	11/30/22	11,968	$217	$0	$116	$333	$0.0097	0
12/1/22	12/15/22	7,480	$217	$0	$72	$290	$0.0097	0
12/16/22	2/1/23	7,480	$217	$0	$72	$290	$0.0097	0
2/2/23	2/24/23	5,236	$217	$0	$51	$268	$0.0097	0
TOTALS		79,288	$2,391	$0	$816	$3,425	$0.0103	0

Washington Elementary School								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90235472- 701877770 / 70187777							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/25/22	3/11/22	27,676	$641	$0	$267	$908	$0.0097	0
3/12/22	4/24/22	85,272	$641	$0	$824	$1,464	$0.0097	0
4/25/22	5/20/22	35,904	$641	$0	$347	$988	$0.0097	0
5/21/22	6/21/22	50,864	$641	$0	$491	$1,132	$0.0097	0
6/22/22	7/29/22	3,740	$641	$0	$36	$677	$0.0097	0
7/30/22	8/19/22	5,236	$641	$0	$51	$691	$0.0097	0
8/20/22	9/26/22	35,156	$641	$0	$340	$980	$0.0097	0
9/27/22	10/28/22	38,896	$641	$0	$376	$1,017	$0.0097	0
10/29/22	11/30/22	83,028	$641	$0	$802	$1,443	$0.0097	0
12/1/22	12/15/22	42,636	$641	$0	$412	$1,053	$0.0097	0
12/16/22	2/1/23	49,368	$641	$0	$477	$1,118	$0.0097	0
2/2/23	2/24/23	32,912	$641	$0	$318	$959	$0.0097	0
TOTALS		490,688	$7,691	$0	$4,739	$12,430	$0.0097	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Woodbrook Elementary School Baseline Energy Use

Woodbrook Elementary School							ELECTRIC METER #1					
Provider:	PSEG			Account #	42-609-023-18				Meter #	9205775 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	Large Power & Lighting Secondary (LPLS)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
2/19/22	3/22/22	48,165	151	$716	$4,556	$371	$570	$6,213	$0.109	32	42%	164,338,980
3/23/22	4/21/22	43,025	180	$640	$4,070	$371	$682	$5,763	$0.109	30	33%	146,801,300
4/22/22	5/20/22	43,834	187	$654	$4,147	$371	$707	$5,878	$0.110	29	34%	149,561,608
5/21/22	6/21/22	54,207	242	$817	$5,128	$371	$3,148	$9,463	$0.110	32	29%	184,954,284
6/22/22	7/21/22	41,469	154	$644	$3,923	$371	$2,084	$7,022	$0.110	30	37%	141,492,228
7/22/22	8/19/22	40,237	123	$625	$3,806	$371	$1,669	$6,472	$0.110	29	47%	137,288,644
8/20/22	9/20/22	59,903	222	$931	$10,206	$371	$3,004	$14,512	$0.186	32	35%	204,389,036
9/21/22	10/19/22	46,826	200	$752	$6,308	$371	$893	$8,323	$0.151	29	34%	159,770,312
10/20/22	11/17/22	45,935	174	$750	$5,839	$371	$777	$7,737	$0.143	29	38%	156,730,220
11/18/22	12/20/22	52,208	144	$853	$7,636	$371	$643	$9,503	$0.163	33	46%	178,133,696
12/21/22	1/21/23	49,312	144	$806	$7,333	$371	$645	$9,155	$0.165	32	44%	168,252,544
1/22/23	2/21/23	51,576	145	$846	$5,775	$371	$646	$7,638	$0.128	31	48%	175,977,312
TOTALS		576,697	242	$9,034	$68,727	$4,450	$15,468	$97,678	$0.135	368	27%	1,967,690,164

Woodbrook Elementary School							Natural Gas Meter #1	
Provider	Elizabethtown Gas		Account #	2639881031			Meter #	3204568 - Main Gas
Commodity	Direct Energy		Account #	777164			Rate Tariff	General Delivery Service
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
2/17/22	3/21/22	5,885	$2,046	$164	$4,891	$7,101	$1.18	126,270,000
3/31/22	4/30/22	3,163	$1,945	$38	$1,538	$3,520	$1.10	16,512,000
5/1/22	5/31/22	881	$1,209	$38	$429	$1,676	$1.86	10,300,000
6/1/22	6/30/22	197	$985	$38	$96	$1,118	$5.50	10,330,000
7/1/22	7/31/22	114	$960	$38	$55	$1,053	$8.93	24,840,000
8/1/22	8/31/22	126	$1,000	$38	$60	$1,098	$8.43	53,716,000
8/31/22	9/30/22	320	$1,228	$62	$156	$1,446	$4.32	524,779,000
10/1/22	10/31/22	2,016	$18,713	$62	$981	$19,755	$9.77	591,336,000
11/1/22	11/30/22	4,438	$2,644	$62	$2,158	$4,864	$1.08	998,631,000
12/1/22	12/31/22	7,657	$3,750	$62	$6,893	$10,705	$1.39	699,612,000
1/1/23	1/31/23	7,814	$3,885	$62	$7,033	$10,980	$1.40	546,499,000
2/1/23	2/28/23	6,695	$3,573	$62	$6,026	$9,660	$1.43	316,285,000
TOTALS		39,306	$41,939	$723	$30,315	$72,976	$1.84	3,919,110,000

Woodbrook Elementary School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	6040433621- 20805975							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/18/22	3/16/22	65,076	$478	$534	$629	$1,640	$0.0179	0
3/17/22	4/18/22	118,932	$478	$1,162	$1,149	$2,789	$0.0194	0
4/19/22	5/17/22	63,580	$478	$521	$614	$1,613	$0.0179	0
5/18/22	6/16/22	99,484	$478	$816	$961	$2,254	$0.0179	0
6/17/22	7/19/22	58,344	$478	$478	$563	$1,520	$0.0179	0
7/20/22	8/16/22	57,596	$478	$472	$556	$1,506	$0.0179	0
8/17/22	9/19/22	136,884	$478	$1,122	$1,322	$2,922	$0.0179	0
9/20/22	10/18/22	171,292	$478	$1,404	$1,654	$3,537	$0.0179	0
10/19/22	11/17/22	169,048	$478	$1,386	$1,633	$3,497	$0.0179	0
11/18/22	12/16/22	162,316	$478	$1,331	$1,568	$3,376	$0.0179	0
12/17/22	1/19/23	78,540	$493	$674	$759	$1,926	$0.0182	0
1/20/23	2/16/23	69,564	$505	$619	$672	$1,796	$0.0186	0
TOTALS		1,181,092	$5,273	$9,986	$12,079	$28,377	$0.0187	0

Woodbrook Elementary School								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	6926869692- 00001111 (FPM)							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/17/22	3/16/22	0	$572	$0	$0	$572	$0.00	0
6/16/21	4/19/22	0	$572	$0	$0	$572	$0.00	0
4/20/22	5/17/22	0	$572	$0	$0	$572	$0.00	0
5/18/22	6/16/22	0	$572	$0	$0	$572	$0.00	0
6/17/22	7/19/22	0	$572	$0	$0	$572	$0.00	0
7/20/22	8/16/22	0	$572	$0	$0	$572	$0.00	0
8/17/22	9/19/22	0	$572	$0	$0	$572	$0.00	0
9/20/22	10/18/22	0	$572	$0	$0	$572	$0.00	0
10/19/22	11/17/22	0	$572	$0	$0	$572	$0.00	0
11/18/22	12/16/22	0	$572	$0	$0	$572	$0.00	0
12/17/22	1/19/23	0	$567	$0	$0	$567	$0.00	0
1/20/23	2/16/23	0	$564	$0	$0	$564	$0.00	0
TOTALS		0	$6,278	$0	$0	$6,850	$0.00	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Franklin D. Roosevelt Round Building Baseline Energy Use

FDR Round Building							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-319-03				Meter #	9222251 - Main Electric		
Commodity:	PSEG BGS			Commodity:	on PSEG Bill				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
4/22/21	4/21/22	5,560	38.80	$124	$611	$5	$154	$893	$0.132	365	2%	18,970,720
4/22/22	5/20/22	3,200	8.00	$71	$483	$5	$32	$591	$0.173	29	57%	10,918,400
5/21/22	6/21/22	33,120	8.00	$578	$2,241	$5	$113	$2,936	$0.085	32	539%	113,005,440
6/22/22	7/21/22	2,960	8.00	$53	$373	$5	$117	$549	$0.144	30	51%	10,099,520
7/22/22	8/19/22	2,920	8.00	$53	$371	$5	$117	$545	$0.145	29	52%	9,963,040
8/20/22	9/20/22	19,640	10.00	$354	$1,205	$5	$146	$1,710	$0.079	32	256%	67,011,680
9/21/22	10/19/22	8,040	44.80	$190	$544	$5	$209	$947	$0.091	29	26%	27,432,480
10/20/22	11/17/22	8,040	44.80	$192	$544	$5	$209	$950	$0.092	29	26%	27,432,480
11/18/22	12/20/22	9,160	44.80	$219	$690	$5	$209	$1,122	$0.099	33	26%	31,253,920
12/21/22	1/23/23	8,360	8.00	$200	$692	$5	$37	$934	$0.107	34	128%	28,524,320
1/24/23	2/21/23	9,720	44.80	$233	$775	$5	$209	$1,221	$0.104	29	31%	33,164,640
2/22/23	3/22/23	10,920	124.80	$2	$875	$5	$281	$1,162	$0.080	29	13%	37,259,040
TOTALS		121,640	125	$2,268	$9,403	$59	$1,832	$13,561	$0.096	700	6%	415,035,680

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Edison Early Learning Center Baseline Energy Use

Edison Early Learning Center							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-312-02				Meter #	278003345 - Main Electric/3090006576(New)		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff:	General Light & Power		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
3/22/22	4/20/22	1,920	17	$43	$182	$5	$68	$297	$0.117	30	16%	6,551,040
4/21/22	5/19/22	21,630	22	$482	$2,046	$5	$89	$2,622	$0.117	29	139%	73,801,560
5/20/22	6/18/22	7,335	28	$128	$694	$5	$390	$1,216	$0.112	30	37%	25,027,020
6/19/22	7/20/22	9,105	28	$164	$861	$5	$416	$1,446	$0.113	32	42%	31,066,260
7/21/22	9/19/22	11,250	61	$203	$1,064	$10	$897	$2,174	$0.113	61	13%	38,385,000
9/20/22	10/18/22	5,730	32	$135	$1,306	$5	$148	$1,594	$0.252	29	26%	19,550,760
10/19/22	11/16/22	4,755	20	$114	$994	$5	$95	$1,207	$0.233	29	34%	16,224,060
11/17/22	12/19/22	3,675	15	$88	$845	$5	$70	$1,008	$0.254	33	31%	12,539,100
12/20/22	1/20/23	6,705	16	$160	$865	$5	$75	$1,105	$0.153	32	54%	22,877,460
1/21/23	2/17/23	4,760	16	$114	$1,385	$5	$75	$1,579	$0.315	28	44%	16,241,120
2/18/23	3/21/23	5,880	15	$141	$823	$5	$71	$1,040	$0.164	32	50%	20,062,560
3/22/23								$0	$0.00	(45006)	-	0
TOTALS		82,745	61	$1,771	$11,067	$59	$2,392	$15,288	$0.155	(44641)	0%	282,325,940

Edison Early Learning Center						Natural Gas Meter #1		
Provider	PSEG		Account #	7543631202		Meter #	3166832 - Main Gas	
Commodity	Direct Energy		Commodity	361155		Rate Tariff:	General Service Gas	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
3/21/22	4/20/22	471	$176	$19	$245	$439	$0.89	6,750,600
4/21/22	5/19/22	71	$24	$19	$37	$79	$0.85	4,749,400
5/20/22	6/18/22	33	$11	$19	$17	$47	$0.86	3,193,800
6/19/22	7/20/22	35	$12	$19	$17	$49	$0.84	3,086,700
7/21/22	9/19/22	162	$57	$38	$84	$179	$0.87	94,767,700
9/20/22	10/18/22	226	$101	$19	$117	$238	$0.97	5,737,900
10/19/22	11/16/22	329	$151	$19	$171	$341	$0.98	32,488,800
11/17/22	12/19/22	915	$433	$20	$475	$928	$0.99	75,219,800
12/20/22	1/20/23	1,014	$484	$19	$780	$1,283	$1.25	129,228,700
1/21/23	2/17/23	709	$337	$20	$652	$1,009	$1.40	115,977,500
2/18/23	3/21/23	993	$473	$20	$913	$1,406	$1.40	107,345,600
3/22/23						$0	-	47,143,500
TOTALS		4,959	$2,260	$230	$3,508	$5,998	$1.16	625,690,000

Edison Early Learning Center								
Provider	Edison Water Utility			Water & Sewer (Gal)				
Acct #	90048533-60784519							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/25/22	3/23/22	5,984	$104	$0	$58	$162	$0.0097	0
3/24/22	4/25/22	5,236	$104	$0	$51	$155	$0.0097	0
4/26/22	5/20/22	5,236	$104	$0	$51	$155	$0.0097	0
5/21/22	6/21/22	5,236	$104	$0	$51	$155	$0.0097	0
6/22/22	7/29/22	2,244	$104	$0	$22	$126	$0.0097	0
7/30/22	8/19/22	0	$104	$0	$0	$104	$0.00	0
8/20/22	9/26/22	7,480	$104	$0	$72	$177	$0.0097	0
9/27/22	10/28/22	4,488	$104	$0	$43	$148	$0.0097	0
1/28/22	11/30/22	8,228	$104	$0	$79	$184	$0.0097	0
12/1/22	12/15/22	5,236	$104	$0	$51	$155	$0.0097	0
12/16/22	2/1/23	8,228	$104	$0	$79	$184	$0.0097	0
2/2/23	2/24/23	5,236	$104	$0	$51	$155	$0.0097	0
TOTALS		62,832	$1,253	$0	$607	$1,860	$0.0097	0

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Edison Education Center Baseline Energy Use

Edison Education Center							ELECTRIC METER #1					
Provider:	PSEG			Account #	75-436-288-05				Meter #	728003997 - Main Electric		
Commodity:	Direct Energy			Commodity	1350519				Rate Tariff:	General Light & Power (GLP)		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
3/22/22	4/21/22	10,880	73	$242	$1,045	$5	$288	$1,575	$0.118	31	20%	37,122,560
4/22/22	5/20/22	20,160	66	$449	$1,921	$5	$260	$2,630	$0.118	29	44%	68,785,920
5/21/22	6/21/22	25,840	90	$451	$2,462	$5	$1,262	$4,175	$0.113	32	38%	88,166,080
6/22/22	7/21/22	28,800	100	$519	$2,737	$5	$1,464	$4,721	$0.113	30	40%	98,265,600
7/22/22	8/22/22	29,520	96	$532	$2,807	$5	$1,406	$4,744	$0.113	32	40%	100,722,240
8/23/22	9/20/22	27,280	106	$492	$2,593	$5	$1,558	$4,643	$0.113	29	37%	93,079,360
9/21/22	10/19/22	21,920	85	$517	$2,087	$5	$395	$3,000	$0.119	29	37%	74,791,040
10/20/22	11/17/22	20,400	66	$487	$1,944	$5	$309	$2,740	$0.119	29	44%	69,604,800
11/16/22	12/20/22	26,160	16	$625	$2,490	$5	$75	$3,189	$0.119	35	195%	89,257,920
12/21/22	1/20/23	18,880	58	$451	$2,629	$5	$272	$3,352	$0.163	31	43%	64,418,560
1/21/23	2/21/23	22,800	54	$546	$2,602	$5	$253	$3,401	$0.138	32	55%	77,793,600
2/22/23	3/22/23	21,360	52	$512	$2,602	$5	$242	$3,357	$0.146	29	59%	72,880,320
TOTALS		274,000	106	$5,823	$27,919	$59	$7,784	$41,526	$0.123	368	29%	934,888,000

Edison Education Center						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	018-9083-001		Meter #	3498941 - Main Gas	
Commodity	Direct Energy		Commodity	777157		Rate Tariff:	General Delivery Service	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
2/18/22	3/22/22	1,093	$497	$38	$532	$1,066	$0.94	109,344,000
3/22/22	4/20/22	740	$367	$38	$360	$764	$0.98	73,982,000
4/21/22	5/19/22	309	$224	$38	$150	$412	$1.21	30,900,000
5/20/22	6/21/22	46	$139	$38	$23	$199	$3.48	4,646,000
6/22/22	7/20/22	30	$124	$38	$15	$177	$4.57	3,033,000
7/20/22	8/22/22	33	$135	$38	$16	$188	$4.56	3,310,000
8/22/22	9/21/22	33	$154	$55	$16	$225	$5.14	3,310,000
9/22/22	10/20/22	170	$209	$62	$153	$424	$2.13	17,001,000
10/21/22	11/17/22	314	$262	$62	$914	$1,239	$3.74	31,426,000
11/18/22	12/19/22	1,253	$603	$62	$1,128	$1,793	$1.38	125,317,000
12/20/22	1/23/23	1,618	$734	$62	$1,457	$2,253	$1.35	161,782,000
1/24/23	2/17/23	1,049	$536	$62	$945	$1,543	$1.41	104,882,000
TOTALS		6,689	$3,986	$589	$5,708	$10,283	$1.45	668,933,000

Edison Education Center								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	6670600000- 5621129							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/4/22	5/5/22	0	$1,200	$0	$0	$1,200	$0.00	0
5/6/22	8/4/22	0	$1,200	$0	$0	$1,200	$0.00	0
8/5/22	11/4/22	0	$1,200	$0	$0	$1,200	$0.00	0
11/5/22	2/6/23	0	$1,193	$0	$0	$1,193	$0.00	0
2/7/23					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
1/1/00					$0	$0	$0.00	0
TOTALS		0	$4,793	$0	$0	$4,793	$0.00	0

Edison Education Center								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	7670600000- 85512376							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/5/22	5/5/22	59,840	$459	$491	$578	$1,527	$0.0179	0
5/6/22	8/4/22	48,620	$459	$399	$470	$1,327	$0.0179	0
8/5/22	11/4/22	77,792	$459	$638	$751	$1,848	$0.0179	0
11/5/22	2/6/23	49,368	$469	$418	$477	$1,364	$0.0181	0
2/7/23						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
TOTALS		235,620	$1,846	$1,945	$2,276	$6,067	$0.0179	0

Buildings and Grounds Baseline Energy Use

Building and Grounds							ELECTRIC METER #1					
Provider:	PSEG			Account #	75 436 292 08				Meter #	626103285 - Shed		
Commodity:	Direct Energy			Commodity:	1152684				Meter #	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/19/22	3/22/22	2,346	5	$52	$222	$5	$20	$299	$0.117	32	61%	8,004,552
3/23/22	4/21/22	1,903	5	$42	$180	$5	$20	$247	$0.117	30	53%	6,493,036
4/22/22	5/20/22	2,370	4	$53	$224	$5	$15	$297	$0.117	29	90%	8,086,440
5/21/22	6/22/22	1,852	4	$32	$175	$5	$59	$272	$0.112	33	56%	6,319,024
6/23/22	7/21/22	566	4	$10	$54	$5	$63	$132	$0.113	29	19%	1,931,192
7/22/22	8/19/22	1,566	4	$28	$148	$5	$63	$244	$0.113	29	52%	5,343,192
8/20/22	10/19/22	3,283	8	$68	$314	$10	$79	$471	$0.116	61	27%	11,201,596
10/20/22	11/17/22	1,467	4	$35	$221	$5	$17	$278	$0.175	29	57%	5,005,404
11/18/22	12/20/22	2,022	1	$48	$197	$5	$2	$253	$0.122	33	511%	6,899,064
12/21/22	1/20/23	1,692	5	$40	$301	$5	$21	$367	$0.201	31	51%	5,773,104
1/21/23	2/21/23	1,706	4	$41	$287	$5	$18	$351	$0.192	32	58%	5,820,872
								$0	$0.00	1	0%	0
TOTALS		20,773	8	$451	$2,323	$59	$377	$3,210	$0.134	369	29%	70,877,476

Building and Grounds							ELECTRIC METER #2					
Provider:	PSEG			Account #	75-436-293-05				Meter #	727000650 - Main Electric		
Commodity:	Direct Energy			Commodity:	1152684				Rate Tariff	General Light & Power (GLP)		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
2/19/22	3/21/22	2,440	10	$54	$231	$5	$38	$328	$0.117	31	34%	8,325,280
3/22/22	4/21/22	2,080	9	$46	$197	$5	$36	$284	$0.117	31	30%	7,096,960
4/22/22	5/20/22	2,080	7	$46	$197	$5	$28	$276	$0.117	29	42%	7,096,960
5/21/22	6/22/22	2,080	10	$36	$197	$5	$141	$379	$0.112	33	26%	7,096,960
6/23/22	7/21/22	5,000	11	$90	$473	$5	$158	$726	$0.113	29	67%	17,060,000
7/22/22	8/19/22	3,840	11	$69	$363	$5	$158	$596	$0.113	29	51%	13,102,080
8/20/22	9/20/22	3,320	10	$60	$314	$5	$146	$525	$0.113	32	43%	11,327,840
9/21/22	10/19/22	3,080	11	$73	$291	$5	$50	$419	$0.118	29	41%	10,508,960
10/20/22	11/17/22	2,120	10	$51	$201	$5	$45	$301	$0.118	29	32%	7,233,440
11/18/22	12/20/22	2,640	8	$63	$250	$5	$37	$355	$0.118	33	42%	9,007,680
12/21/22	1/20/23	2,280	9	$54	$216	$5	$41	$316	$0.118	31	35%	7,779,360
1/21/23	2/21/23	2,320	10	$56	$219	$5	$48	$328	$0.119	32	29%	7,915,840
TOTALS		33,280	11	$698	$3,148	$59	$928	$4,834	$0.116	368	35%	113,551,360

Building and Grounds						Natural Gas Meter #1		
Provider	Elizabethtown Gas		Account #	9235754881		Meter #	2661540 - Main Gas	
Commodity	Direct Energy		Commodity	777162		Rate Tariff	General Delivery Serivce	
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
2/18/22	3/22/22	1,748	$755	$38	$631	$1,423	$0.79	54,887,000
3/20/22	4/20/22	1,223	$560	$38	$459	$1,057	$0.83	15,187,000
4/20/22	5/19/22	498	$320	$38	$205	$562	$1.05	1,237,000
5/19/21	6/21/22	32	$169	$38	$3	$210	$5.37	516,000
6/22/22	7/19/22	0	$160	$38	$0	$198	-	827,000
7/20/22	8/22/22	0	$159	$38	$0	$197	-	15,814,000
8/23/22	9/21/22	2	$184	$55	$0	$238	$88.65	66,757,000
9/22/22	10/20/22	504	$365	$62	$129	$556	$0.98	160,001,000
10/21/22	11/17/22	797	$475	$62	$226	$763	$0.88	216,853,000
11/18/22	12/19/22	2,200	$986	$62	$1,166	$2,214	$0.98	206,275,000
12/20/22	1/23/22	2,642	$1,145	$62	$1,731	$2,938	$1.09	174,785,000
1/24/22	2/17/23	1,773	$844	$62	$1,099	$2,005	$1.10	122,262,000
TOTALS		11,420	$6,122	$589	$5,649	$12,360	$1.03	1,035,401,000

Building and Grounds								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	6179400000- 86912136							
Billing Period Start Date	**Actual Reading**	**Water & Sewer (Gal)**	**Fixed Charges**	**Usage Charges**	**Sewer Usage Charges**	**Total Charges**	**Cost / Unit Checksum**	**BTU**
1/7/22	4/6/22	5,984	$287	$49	$58	$394	$0.0179	0
4/7/22	7/7/22	15,708	$287	$129	$152	$567	$0.0179	0
7/8/22	10/5/22	15,708	$287	$129	$152	$567	$0.0179	0
10/6/22						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
1/1/00						$0	$0.00	0
TOTALS		37,400	$860	$307	$361	$1,528	$0.0179	0

Building and Grounds								
Provider	Middlesex Water			Water & Sewer (Gal)				
Acct #	8919500000-00000395							
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Sewer Usage Charges	Total Charges	Cost / Unit Checksum	BTU
2/16/22	3/15/22	0	$197	$0	$0	$197	$0.00	0
3/16/22	4/18/22	0	$197	$0	$0	$197	$0.00	0
4/19/22	5/16/22	0	$197	$0	$0	$197	$0.00	0
5/17/22	6/15/22	0	$197	$0	$0	$197	$0.00	0
6/16/22	7/18/22	0	$197	$0	$0	$197	$0.00	0
7/19/22	8/15/22	0	$197	$0	$0	$197	$0.00	0
8/16/22	9/16/22	0	$197	$0	$0	$197	$0.00	0
9/17/22	10/17/22	0	$197	$0	$0	$197	$0.00	0
10/18/22	11/16/22	1,496	$197	$12	$14	$224	$0.0179	0
11/17/22	12/15/22	0	$197	$0	$0	$197	$0.00	0
12/16/22	1/18/23	1,496	$195	$13	$14	$222	$0.0182	0
1/19/23	2/15/23	0	$194	$0	$0	$194	$0.00	0
TOTALS		2,992	$2,357	$25	$29	$2,411	$0.0180	0

Energy Savings Utility Rates

DCO Energy used the following marginal rates to calculate energy cost savings:

CALCULATED UTILITY RATES - MARGINAL RATES USED FOR SAVINGS					
BUILDING/FACILITY	ELECTRIC			NATURAL GAS	Water & Sewer (Gal)
	$ / kW Oct. thru May	$ / kW June thru Sept.	$ / kWh Marginal Rate	$ / Therm Marginal Rate	$ / Gal Marginal Rate
Edison High School	$5.689	$10.242	$0.190	$1.034	$0.0097
John P. Stevens High School	$6.448	$8.827	$0.183	$1.206	$0.0184
Herbert Hoover Middle School	$6.830	$8.677	$0.130	$1.317	$0.0171
John Adams Middle School	$6.135	$7.762	$0.115	$1.229	$0.0180
Thomas Jefferson Middle School	$5.732	$10.743	$0.098	$1.058	$0.0097
Woodrow Wilson Middle School	$6.481	$8.243	$0.085	$1.419	$0.0179
Benjamin Franklin Elementary School	$4.555	$12.578	$0.108	$1.031	$0.0124
James Madison Intermediate School	$5.829	$7.740	$0.121	$1.295	$0.0181
James Madison Primary School	$7.038	$9.536	$0.151	$1.230	$0.0181
James Monroe Elementary School	$7.544	$9.172	$0.103	$1.586	$0.0179
John Marshall Elementary School	$5.621	$10.342	$0.187	$1.060	$0.0118
Lincoln Elementary School	$6.079	$11.789	$0.129	$1.112	$0.0165
Lindeneau Elementary School	$6.082	$11.486	$0.159	$1.085	$0.0107
Martin Luther King Elementary School	$7.120	$9.708	$0.159	$1.190	$0.0179
Washington Elementary School	$6.302	$15.793	$0.123	$1.162	$0.0103
Woodbrook Elementary School	$6.795	$8.679	$0.135	$1.838	$0.0187
FDR Round Building	$4.028	$11.830	$0.096	$0.00	$0.0181
Edison Early Learning Center	$4.568	$12.806	$0.155	$1.163	$0.0097
Edison Education Center	$6.637	$12.502	$0.123	$1.449	$0.0179
Building and Grounds	$7.263	$9.559	$0.122	$1.031	$0.0179

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 3 – ENERGY CONSERVATION MEASURES

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Energy Conservation Measure Breakdown by Building

The matrix below details which ECMs were applied and evaluated by building.

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
1a	LED Tube Retrofit	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1b	Lighting Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2a	Energy Management System - Plant Equipment	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔				
2b	Energy Management System - Terminal Equipment	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔		✔	✔	✔	
3	Boiler Replacement		✔		✔	✔		✔				✔	✔	✔	✔	✔			✔		
4	Steam Trap Replacement	✔											✔			✔					
5	Variable Frequency Drives on HW Pumps		✔	✔	✔	✔		✔	✔	✔		✔					✔				
6	Rooftop Unit Replacement			✔											✔	✔			✔	✔	
7	Unit Ventilator Replacement					✔						✔				✔		✔	✔		
8	Addition of Cooling					✔						✔				✔		✔			
9	Pipe and Valve Insulation	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔				
10	Building Envelope Weatherization	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
11	Water Conservation	✔	✔	✔	✔		✔		✔	✔	✔		✔		✔	✔	✔	✔		✔	✔
12	Plug Load Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
13	PC Power Management	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
14	Solar PPA	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
15	Combined Heat & Power Unit		✔																		
16	eTemp Refrigeration Sensor	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔				
17	Roof Upgrades	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	
18	Retrocommissioning	✔	✔								✔										
19	Asbestos Abatement		✔													✔					
20	Exhaust Fan Replacement	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔		

ECM Breakdown by Cost & Savings

EDISON TWP PUBLIC SCHOOLS		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	$	$	$	$	$	$	$	$	YEARS
1a	LED Tube Retrofit	$1,845,090	$332,176	($4,585)	$0	$0	$327,591	$50,630	$378,221	4.9
1b	Lighting Controls	$1,072,927	$63,108	($923)	$0	$0	$62,185	$0	$62,185	17.3
2a	Energy Management System - Plant Equipment	$547,813	$0	$97,031	$0	$0	$97,031	$0	$97,031	5.6
2b	Energy Management System - Terminal Equipment	$3,179,727	$7,787	$2,583	$0	$0	$10,370	$0	$10,370	306.6
3	Boiler Replacement	$1,770,801	$0	$27,945	$0	$0	$27,945	$2,243	$30,187	58.7
4	Steam Trap Replacement	$187,305	$0	$19,675	$0	$0	$19,675	$1,815	$21,490	8.7
5	Variable Frequency Drives on HW Pumps	$278,080	$10,790	$0	$0	$0	$10,790	$650	$11,440	24.3
6	Rooftop Unit Replacement	$496,908	$7,245	$2,561	$0	$0	$9,806	$1,972	$11,779	42.2
7	Unit Ventilator Replacement	$386,250	$771	$0	$0	$0	$771	$293	$1,064	362.9
8	Addition of Cooling	$321,875	($3,514)	$0	$0	$0	($3,514)	$0	($3,514)	-
9	Pipe and Valve Insulation	$249,019	$0	$50,308	$0	$0	$50,308	$0	$50,308	4.9
10	Building Envelope Weatherization	$707,011	$14,657	$38,496	$0	$0	$53,153	$0	$53,153	13.3
11	Water Conservation	$196,905	$189	$6,051	$0	$42,165	$48,404	$0	$48,404	4.1
12	Plug Load Controls	$176,670	$22,674	$0	$0	$0	$22,674	$0	$22,674	7.8
13	PC Power Management	$144,099	$22,504	$0	$0	$0	$22,504	$0	$22,504	6.4
14	Solar PPA	$0	$987,689	$0	($191,067)	$0	$796,622	$0	$796,622	0.0
15	Combined Heat & Power Unit	$389,482	$25,092	($7,167)	$0	$0	$17,925	$0	$17,925	21.7
16	eTemp Refrigeration Sensor	$81,907	$31,411	$0	$0	$0	$31,411	$0	$31,411	2.6
17	Roof Upgrades	$7,046,993	$2,868	$12,838	$0	$0	$15,706	$23,928	$39,634	177.8
18	Retrocommissioning	$291,000	$24,353	$14,313	$0	$0	$38,665	$0	$38,665	7.5
19	Asbestos Abatement	$450,000	$0	$0	$0	$0	$0	$0	$0	-
20	Exhaust Fan Replacement	$123,000	$2,138	$0	$0	$0	$2,138	$1,194	$3,332	36.9
	TOTALS	$19,942,863	$1,551,937	$259,126	($191,067)	$42,165	$1,662,161	$82,724	$1,744,885	11.4

ECM Breakdown by Greenhouse Gas Reduction

EDISON TWP PUBLIC SCHOOLS		Reduction of CO_2	Reduction of Nox	Reduction of SO_2	Reduction of Hg
ECM #	ENERGY CONSERVATION MEASURE	LBS	LBS	LBS	LBS
1a	LED Tube Retrofit	2,031,450	1,758	4,170	8,774
1b	Lighting Controls	390,887	338	803	1,689
2a	Energy Management System - Plant Equipment	931,479	732	0	0.0
2b	Energy Management System - Terminal Equipment	81,081	68	109	228.9
3	Boiler Replacement	272,984	215	0	0
4	Steam Trap Replacement	215,001	169	0	0
5	Variable Frequency Drives on HW Pumps	63,004	54	127	266
6	Rooftop Unit Replacement	69,626	59	98	207
7	Unit Ventilator Replacement	8,845	8	18	37
8	Addition of Cooling	-16,717	-14	-34	-70.7
9	Pipe and Valve Insulation	482,160	379	0	0.0
10	Building Envelope Weatherization	484,299	391	259	544
11	Water Conservation	56,548	45	4	9.2
12	Plug Load Controls	183,480	158	369	776
13	PC Power Management	163,207	141	328	690
14	Solar PPA	7,374,516	6,369	14,816	31,174
15	Combined Heat & Power Unit	86,153	45	81	0
16	eTemp Refrigeration Sensor	232,760	201	468	983.9
17	Roof Upgrades	147,320	117	42	89
18	Retrocommissioning	301,681	249	311	655
19	Asbestos Abatement	0	0	0	0.0
20	Exhaust Fan Replacement	17,275	15	35	73.0
	TOTALS	13,577,037	11,497	22,003	46,126

Note: Factors used to calculate Greenhouse Gas Reductions are as follows.

	UTILITIES		
	ELECTRIC	NATURAL GAS	OTHER ENERGY #2
UNITS	kW & kWh	Therms	Solar Owned (kWh)
BTU MULTIPLIER	3,412	100,000	3,412
CO2 EMISSION FACTOR (LB CO2/UNIT FUEL)	1.10	11.70	0.00
SITE-SOURCE MULTIPLIER	2.80	1.05	1.00

- ***NOx = (0.00095*kWh Savings) + (0.0092*Therm Savings)***
- ***SO2 = (0.00221*kWh Savings)***
- ***Hg = (0.00465*kWh Savings)***

See Combined Heat and Power ECM for emission calculation per NJ BPU Protocols.

ECM Breakdown by Building

Please see Appendix F for ECM Breakdown by Building.

ECM Budgeting Narrative

The budgetary costs carried in the project are based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a data base of actual installed costs for various ECMs.

EDISON TWP PUBLIC SCHOOLS		INSTALLED COST
ECM #	ENERGY CONSERVATION MEASURE	$
1a	LED Tube Retrofit	$1,845,090
1b	Lighting Controls	$1,072,927
2a	Energy Management System - Plant Equipment	$547,813
2b	Energy Management System - Terminal Equipment	$3,179,727
3	Boiler Replacement	$1,770,801
4	Steam Trap Replacement	$187,305
5	Variable Frequency Drives on HW Pumps	$278,080
6	Rooftop Unit Replacement	$496,908
7	Unit Ventilator Replacement	$386,250
8	Addition of Cooling	$321,875
9	Pipe and Valve Insulation	$249,019
10	Building Envelope Weatherization	$707,011
11	Water Conservation	$196,905
12	Plug Load Controls	$176,670
13	PC Power Management	$144,099
14	Solar PPA	$0
15	Combined Heat & Power Unit	$389,482
16	eTemp Refrigeration Sensor	$81,907
17	Roof Upgrades	$7,046,993
18	Retrocommissioning	$291,000
19	Asbestos Abatement	$450,000
20	Exhaust Fan Replacement	$123,000
	TOTALS	$19,942,863

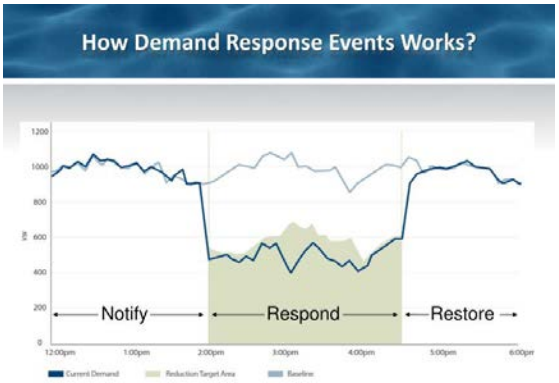
Demand Response & Project Incentives Analysis

Demand Response

Demand Response (DR) is a voluntary Pennsylvania-Jersey-Maryland (PJM) Interconnection program that allows end use customers to reduce their electricity usage during periods of higher power prices. In exchange, end-use customers are compensated through PJM members known as Curtailment Service Providers (CSPs) for decreasing their electricity use when requested by PJM.

Common reduction strategies used in Demand Response include:

- Manual or automatic load drop
- Energy management systems
- Load shedding strategies
- Lighting control strategies
- Backup generation
- Ice storage systems



Benefits of the program include:

- Significant source of new revenue
- Helps to ensure local grid reliability
- Reduces the need for new environmentally taxing energy generation

In the base product, customers commit to reducing their load at the direction of PJM during emergency conditions during the summer months. In the Capacity Performance product, the customer will need to be able to reduce load when directed during the entire year.

Note: Chapter 55 of the applicable law states the ESCO must investigate all Demand Response programs. ESIP projects will only be allowed to bid into the Demand Response program for measures that did not receive utility program incentives. Demand Response is not included because of associated utility incentives for proposed measures.

Prescriptive Rebates

Commercial and industrial facilities with a peak electric demand exceeding 200 kW, the Commercial & Industrial Prescriptive Rebate Program is the best option for maximum rebates and incentives. This program is offered through public utilities and provides the technical and financial means to help improve the energy efficiency of your buildings. The program is designed to take a comprehensive approach to energy savings while allowing you to earn incentives that are directly linked to equipment type and size. This Prescriptive rebate program is your best option for lighting and controls, heating, cooling and ventilation (HVAC), refrigeration, kitchen equipment, Electronically Commutated Motors (ECM), electric water heaters, plug load controls, or variable speed drive (VSD) upgrades and installations.

Prescriptive rebates are designed to cover up to 50 percent of the incremental measure cost for installing high-efficiency equipment. Applications for this rebate are filed through your electric and natural gas provider.

Combined Heat & Power

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 Board of Public Utilities seeks to accomplish this goal by providing generous financial incentives for Combined Heat & Power (CHP) and Fuel Cell (FC) installations.

Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 60% (Higher Heating Value - HHV), Based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

In order to qualify for incentives, systems must operate a minimum of 5,000 full-load equivalent hours per year (i.e. run at least 5,000 hours per year at full rated kW output). The Office of Clean Energy (OCE) may grant exceptions to this minimum operating hours requirement for Critical Facilities, provided the proposed system operates a minimum of 3,500 full-load equivalent hours per year and is equipped with blackstart and islanding capability. For this program, a Critical Facility is defined as any:

(a) public facility, including any federal, state, county, or municipal facility,

(b) non-profit and/or private facility, including any hospital, police station, fire station, water/wastewater treatment facility, school, multifamily building, or similar facility that:

(A) is determined to be either Tier 1 or critical infrastructure by the New Jersey Office of Emergency Management or the State Office of Homeland Security and Preparedness or

(B) could serve as a Shelter during a power outage. A Shelter is a facility able to provide food, sleeping arrangements, and other amenities to its residents and the community.

The CHP, FC, or WHP system must have a ten (10) year all-inclusive warranty. The warranty must cover the major components of the system eligible for the incentive, to protect against breakdown or degradation in electrical output of more than ten percent from the originally rated electrical output. The warranty shall cover the full cost of repair or replacement of defective components or systems, including coverage for labor costs to remove and reinstall defective components or systems. In the event the system warranty does not meet program requirements, customer must purchase an extended warranty or a ten (10) year maintenance/service contract. The cost of the ten (10) year warranty or service contract may be considered as part of the cost of the project. Notwithstanding the foregoing, public entities that are prohibited from entering into agreements for the full ten (10) years may comply with the 10-year requirement by:

(a) providing an agreement for the longest lawful term,
(b) committing the entity to purchase an agreement for the remaining years, and
(c) either:
(i) providing the vendor's commitment for specific pricing for those remaining years, or
(ii) assuming the pricing for the remaining years will increase by 2.5% each year

Incentive Structure:

Eligible Technologies	Size (Installed Rated Capacity)	Incentive ($/kW)	% of Total Cost Cap per project[3]	$ Cap per project[3]
Powered by non-renewable or renewable fuel source, or combination[4]: Gas Internal Combustion Engine	≤500 kW	$2,000	30-40%[2]	$2 million
	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine Microturbine	> 1 MW - 3 MW	$550	30%	$3 million
Fuel Cells with Heat Recovery (FCHR)	>3 MW	$350		
Fuel Cell without Heat Recover (FCwoHR)	Same as above(1)	Applicable amount above	30%	$1 million
Waste Heat to Power	≤ 1MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

Footnotes:

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

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

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

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

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

Incentive Payment Schedule

The total incentive is divided into three partial payments. Each stage of payment requires additional documentation and/or has conditions that must be met. At approval, the maximum incentive partial payment amounts are calculated by multiplying the total incentive by the ratios listed in the following table.

Purchase	Installation	Acceptance of 12 months post-installation performance data
30%	50%	20%

(e.g., for the purpose of calculating a payback period)

Incentive Calculations

All estimated incentive values for Edison Twp BOE ESIP project were based off PSE&G Prescriptive Rebates. The total incentive amount is estimated to be $564,657. The ESIP includes 80% ($325,747) toward project financing as shown on Form VI. Please see below and Appendix E.

Incentive Data									
BUILDING	INCENTIVE TYPE	SOURCE	ECM	QUANTITY	UNITS	INCENTIVE $/UNIT	YEAR 1 INCENTIVE	SUBTOTAL	TOTAL
Edison High School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$29,328	$29,328	**$39,043**
Edison High School	Prescriptive	PSEG	Lighting Controls	334	Sensor	$25.00	$8,350	$8,350	
Edison High School	Prescriptive	PSEG	Plug Load Controls	91		$15.00	$1,365	$1,365	
John P. Stevens High School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$41,554	$41,554	**$97,124**
John P. Stevens High School	Prescriptive	PSEG	Lighting Controls	398	Sensor	$25.00	$9,950	$9,950	
John P. Stevens High School	Prescriptive	PSEG	Plug Load Controls	78		$15.00	$1,170	$1,170	
John P. Stevens High School	Prescriptive	PSEG	Boiler Replacement	10,000	per MBH	$3.50	$35,000	$35,000	
John P. Stevens High School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$9,450.00	$9,450	$9,450	
Herbert Hoover Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$19,657	$19,657	**$30,532**
Herbert Hoover Middle School	Prescriptive	PSEG	Lighting Controls	185	Sensor	$25.00	$4,625	$4,625	
Herbert Hoover Middle School	Prescriptive	PSEG	Plug Load Controls	60		$15.00	$900	$900	
Herbert Hoover Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,500.00	$3,500	$3,500	
Herbert Hoover Middle School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$1,850.00	$1,850	$1,850	
John Adams Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$17,284	$17,284	**$47,264**
John Adams Middle School	Prescriptive	PSEG	Lighting Controls	182	Sensor	$25.00	$4,550	$4,550	
John Adams Middle School	Prescriptive	PSEG	Plug Load Controls	62		$15.00	$930	$930	
John Adams Middle School	Prescriptive	PSEG	Boiler Replacement	6,000	per MBH	$3.50	$21,000	$21,000	
John Adams Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,500.00	$3,500	$3,500	
Thomas Jefferson Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$15,202	$15,202	**$45,242**
Thomas Jefferson Middle School	Prescriptive	PSEG	Lighting Controls	190	Sensor	$25.00	$4,750	$4,750	
Thomas Jefferson Middle School	Prescriptive	PSEG	Plug Load Controls	86		$15.00	$1,290	$1,290	
Thomas Jefferson Middle School	Prescriptive	PSEG	Boiler Replacement	6,000	per MBH	$3.50	$21,000	$21,000	
Thomas Jefferson Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,000.00	$3,000	$3,000	
Woodrow Wilson Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$15,249	$15,249	**$21,634**
Woodrow Wilson Middle School	Prescriptive	PSEG	Lighting Controls	205	Sensor	$25.00	$5,125	$5,125	
Woodrow Wilson Middle School	Prescriptive	PSEG	Plug Load Controls	84		$15.00	$1,260	$1,260	
Benjamin Franklin Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$9,634	$9,634	**$40,114**
Benjamin Franklin Elementary School	Prescriptive	PSEG	Lighting Controls	132	Sensor	$25.00	$3,300	$3,300	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Plug Load Controls	72		$15.00	$1,080	$1,080	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Boiler Replacement	7,000	per MBH	$3.50	$24,500	$24,500	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
James Madison Intermediate School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$10,052	$10,052	**$25,757**
James Madison Intermediate School	Prescriptive	PSEG	Lighting Controls	91	Sensor	$25.00	$2,275	$2,275	
James Madison Intermediate School	Prescriptive	PSEG	Plug Load Controls	42		$15.00	$630	$630	
James Madison Intermediate School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
James Madison Intermediate School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$2,300.00	$2,300	$2,300	
James Madison Primary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$9,226	$9,226	**$14,961**
James Madison Primary School	Prescriptive	PSEG	Lighting Controls	108	Sensor	$25.00	$2,700	$2,700	
James Madison Primary School	Prescriptive	PSEG	Plug Load Controls	49		$15.00	$735	$735	
James Madison Primary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$2,300.00	$2,300	$2,300	

Incentive Data									
BUILDING	INCENTIVE TYPE	SOURCE	ECM	QUANTITY	UNITS	INCENTIVE $/UNIT	YEAR 1 INCENTIVE	SUBTOTAL	TOTAL
James Monroe Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$0	$0	
James Monroe Elementary School	Prescriptive	PSEG	Lighting Controls		Sensor	$25.00	$0	$0	$735
James Monroe Elementary School	Prescriptive	PSEG	Plug Load Controls	49		$15.00	$735	$735	
John Marshall Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$13,091	$13,091	
John Marshall Elementary School	Prescriptive	PSEG	Lighting Controls	134	Sensor	$25.00	$3,350	$3,350	
John Marshall Elementary School	Prescriptive	PSEG	Plug Load Controls	64		$15.00	$960	$960	$26,001
John Marshall Elementary School	Prescriptive	PSEG	Boiler Replacement	2,000	per MBH	$3.50	$7,000	$7,000	
John Marshall Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
Lincoln Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$8,900	$8,900	
Lincoln Elementary School	Prescriptive	PSEG	Lighting Controls	98	Sensor	$25.00	$2,450	$2,450	
Lincoln Elementary School	Prescriptive	PSEG	Plug Load Controls	60		$15.00	$900	$900	$33,481
Lincoln Elementary School	Prescriptive	PSEG	Boiler Replacement	6,066	per MBH	$3.50	$21,231	$21,231	
Lindeneau Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$4,070	$4,070	
Lindeneau Elementary School	Prescriptive	PSEG	Lighting Controls	30	Sensor	$25.00	$750	$750	
Lindeneau Elementary School	Prescriptive	PSEG	Plug Load Controls	53		$15.00	$795	$795	$12,615
Lindeneau Elementary School	Prescriptive	PSEG	Boiler Replacement	2,000	per MBH	$3.50	$7,000	$7,000	
Martin Luther King Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$12,250	$12,250	
Martin Luther King Elementary School	Prescriptive	PSEG	Lighting Controls	111	Sensor	$25.00	$2,775	$2,775	
Martin Luther King Elementary School	Prescriptive	PSEG	Plug Load Controls	42		$15.00	$630	$630	$26,780
Martin Luther King Elementary School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
Martin Luther King Elementary School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$625.00	$625	$625	
Washington Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$10,920	$10,920	
Washington Elementary School	Prescriptive	PSEG	Lighting Controls	104	Sensor	$25.00	$2,600	$2,600	
Washington Elementary School	Prescriptive	PSEG	Plug Load Controls	55		$15.00	$825	$825	$37,276
Washington Elementary School	Prescriptive	PSEG	Boiler Replacement	6,066	per MBH	$3.50	$21,231	$21,231	
Washington Elementary School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$1,700.00	$1,700	$1,700	
Woodbrook Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$11,300	$11,300	
Woodbrook Elementary School	Prescriptive	PSEG	Lighting Controls	186	Sensor	$25.00	$4,650	$4,650	
Woodbrook Elementary School	Prescriptive	PSEG	Plug Load Controls	101		$15.00	$1,515	$1,515	$29,565
Woodbrook Elementary School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
Woodbrook Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
FDR Round Building	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$368	$368	
FDR Round Building	Prescriptive	PSEG	Lighting Controls	39	Sensor	$25.00	$975	$975	
FDR Round Building	Prescriptive	PSEG	Plug Load Controls	21		$15.00	$315	$315	$0
FDR Round Building	Prescriptive	PSEG	PC Power Management	#REF!		$10.00	#REF!	#REF!	
Edison Early Learning Center	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$1,416	$1,416	
Edison Early Learning Center	Prescriptive	PSEG	Lighting Controls	17	Sensor	$25.00	$425	$425	
Edison Early Learning Center	Prescriptive	PSEG	Plug Load Controls	5		$15.00	$75	$75	$4,241
Edison Early Learning Center	Prescriptive	PSEG	Boiler Replacement	2	per Boiler	$850.00	$1,700	$1,700	
Edison Early Learning Center	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$625.00	$625	$625	
Edison Education Center	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$19,475	$19,475	
Edison Education Center	Prescriptive	PSEG	Lighting Controls	145	Sensor	$25.00	$3,625	$3,625	
Edison Education Center	Prescriptive	PSEG	Plug Load Controls	23		$15.00	$345	$345	$30,920
Edison Education Center	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$7,475.00	$7,475	$7,475	
Building and Grounds	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$1,208	$1,208	
Building and Grounds	Prescriptive	PSEG	Lighting Controls	6	Sensor	$25.00	$150	$150	$1,373
Building and Grounds	Prescriptive	PSEG	Plug Load Controls	1		$15.00	$15	$15	

No implied and/or written guarantee is made with respect to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Edison Twp BOE acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

ECM 1 – LED Tube Retrofit with Controls

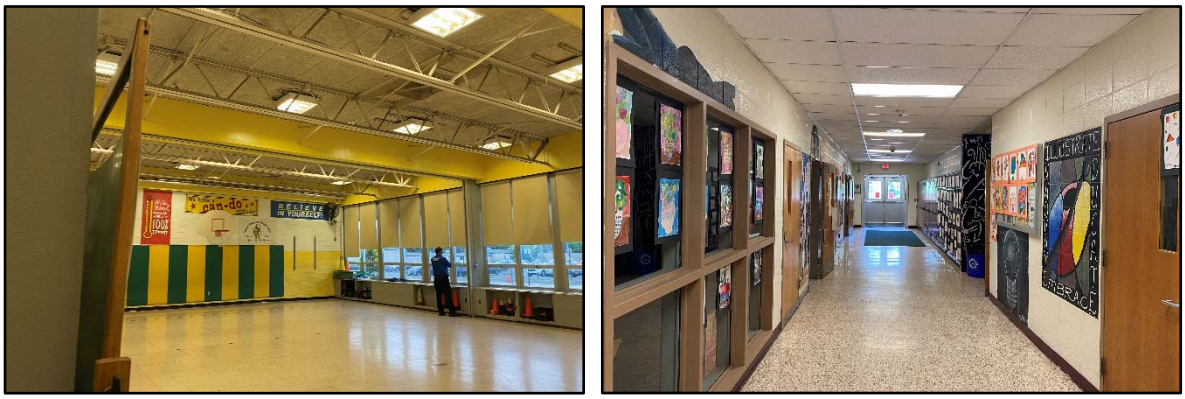
EDISON TWP PUBLIC SCHOOLS		Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included ✔ ECM included in the project																					
ECM #	**ECM DESCRIPTION**																				
1a	LED Tube Retrofit	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1b	Lighting Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Lighting retrofits can greatly reduce energy consumption and lower energy bills, while maintaining lighting levels and quality by upgrading lighting components to more efficient and advanced technologies. Upgrading technologies can also offer employees greater control over lighting, allowing for additional energy savings

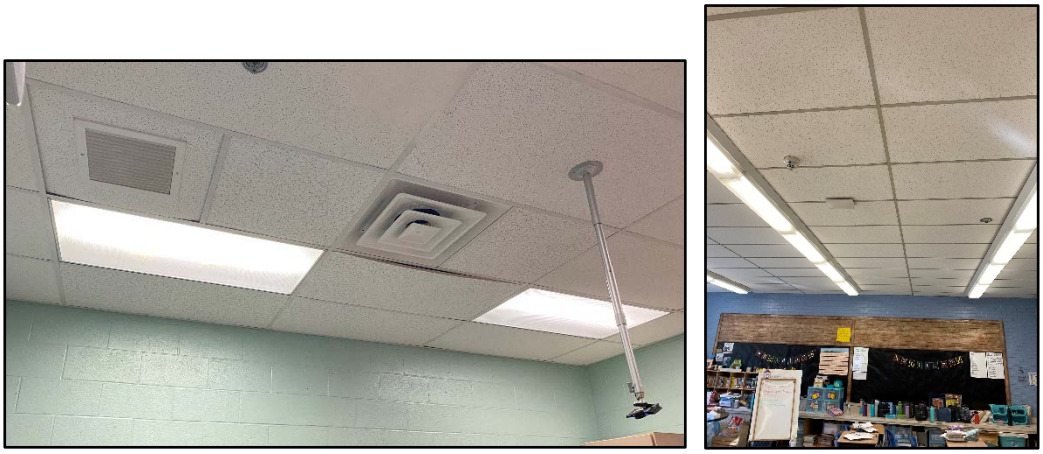
Improvements in lighting technologies have led to increased lifetimes for components that will result in fewer failures and lengthen the time between maintenance activities.

The implementation of a routine maintenance program in addition to the lighting retrofit will greatly simplify the maintenance practices and reduce the operational costs.

Existing Conditions



Existing interior lighting at James Madison Intermediate School and John P. Stevens High School



Existing Interior Lighting at Woodrow Wilson Middle School and Woodbrook Elementary School

Existing Interior Lighting at James Madison Intermediate School and Lindeau Elementary School

Scope of Work 1a – LED Tube

Retrofit existing interior and exterior fixtures with LED tubes as proposed in the line-by-lines. The new LED tubes do not require the existing fluorescent ballasts to operate.

Scope of Work 1a – Lighting Controls

Add occupancy sensors to existing spaces to control LED tubes.

ECM Calculations

BPU Protocols were used to calculate LED lighting savings. A coincidence factor is applied to estimate peak demand savings. The impact on the HVAC systems is captured as well. See saving calculations spreadsheet in supporting documents.

LINE-BY-LINE OUTPUTS						
	LED Lighting Replacement Savings			Lighting Controls Savings		
BUILDING	kW SAVINGS	kWh SAVINGS	THERMS SAVINGS	kW SAVINGS	kWh SAVINGS	THERMS SAVINGS
Edison High School	81.3	233,801	(456.4)	17.6	49,944.9	(104.4)
John P. Stevens High School	116.2	333,198	(659.9)	17.9	50,641.2	(105.9)
Herbert Hoover Middle School	56.3	160,760	(324.0)	10.6	30,163.6	(63.1)
John Adams Middle School	49.8	142,310	(285.7)	9.3	26,388.3	(55.2)
Thomas Jefferson Middle School	43.5	123,481	(254.8)	8.6	24,483.8	(51.2)
Woodrow Wilson Middle School	40.3	115,568	(229.8)	9.9	28,090.5	(58.7)
Benjamin Franklin Elementary School	27.1	77,326	(157.4)	4.7	13,338.8	(27.9)
James Madison Intermediate School	27.0	77,149	(156.1)	5.5	15,437.9	(32.3)
James Madison Primary School	25.2	72,645	(140.8)	4.6	13,040.7	(27.3)
James Monroe Elementary School						
John Marshall Elementary School	37.5	106,456	(219.8)	5.7	16,026.6	(33.5)
Lincoln Elementary School	25.3	72,311	(146.3)	5.1	14,558.0	(30.4)
Lindeneau Elementary School	11.9	33,816	(70.7)	3.0	8,570.9	(17.9)
Martin Luther King Elementary School	31.3	91,082	(168.4)	5.4	15,228.9	(31.8)
Washington Elementary School	31.8	90,351	(185.4)	6.1	17,258.6	(36.1)
Woodbrook Elementary School	32.8	93,221	(191.7)	8.6	24,375.4	(51.0)
FDR Round Building	1.2	2,979	-	2.2	4,560.3	-
Edison Early Learning Center	4.2	11,942	(25.0)	0.8	2,204.0	(4.6)
Edison Education Center	13.7	38,792	(80.5)	3.0	8,616.5	(18.0)
Building and Grounds	3.6	9,704	(19.2)	0.2	402.6	(0.9)

Algorithms

$$\text{DkW} = (\#\ of\ replaced\ fixtures) * (Watts_b) - (\#\ of\ fixtures\ installed) * (Watts_q) = (LPD_b - LPD_q) * (\text{SF})$$

$$\text{Energy Savings}\left(\frac{\text{kWh}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = (\Delta\text{kW}) * (\text{CF}) * (1 + HVAC_d)$$

$$\text{Fuel Savings}\left(\frac{\text{MMBtu}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (\text{HVAC}_g)$$

Definition of Variables

ΔkW	= Change in connected load from baseline to efficient lighting
$\text{Watts}_{b,q}$	= Wattage of existing baseline and qualifying equipment
LPD_b	= Baseline lighting power density in Watt per square foot of space floor area
LPD_q	= Lighting power density of qualified fixtures, equal to the sum of installed fixture wattage divided by floor area of the space where the fixtures are installed.
SF	= Space floor area, in square feet
CF	= Coincidence factor
Hrs	= Annual operating hours
HVAC_d	= HVAC Interactive Factor for peak demand savings
HVAC_e	= HVAC Interactive Factor for annual energy savings
HVAC_g	= HVAC Interactive Factor for annual energy savings

Summary of Inputs

Lighting Verification Performance Lighting

Component	Type	Value	Source
$\text{Watts}_{b,q}$	Variable	See NGrid Fixture Wattage Table Fixture counts and types, space type, floor area from customer application.	1
SF	Variable	From Customer Application	Application
CF	Fixed	See Table by Building Type	4
Hrs	Fixed	See Table by Building Type	4
HVAC_d	Fixed	See Table by Building Type	3, 5
HVAC_e	Fixed	See Table by Building Type	3, 5
HVAC_g	Fixed	See Table by Building Type	6
LPD_b	Variable	Lighting Power Density for, W/SF	2
LPD_q	Variable	Lighting Power Density, W/SF	Application

Hours of Operation and Coincidence Factor by Building Type

Building Type	Sector	CF	Hours
Grocery	Large Commercial/Industrial & Small Commercial	0.96	7,134
Medical - Clinic	Large Commercial/Industrial & Small Commercial	0.8	3,909
Medical - Hospital	Large Commercial/Industrial & Small Commercial	0.8	8,760[54]
Office	Large Commercial/Industrial	0.7	2,969
	Small Commercial	0.67	2,950
Other	Large Commercial/Industrial & Small Commercial	0.66	4,573
Retail	Large Commercial/Industrial	0.96	4,920
	Small Commercial	0.86	4,926
School	Large Commercial/Industrial & Small Commercial	0.50	2,575
Warehouse/ Industrial	Large Commercial/Industrial	0.7	4,116
	Small Commercial	0.68	3,799

Building Type	Sector	CF	Hours
Multifamily – Common Areas[55]	Multifamily	0.86	5,950
Multifamily – In-Unit[36]	Multifamily	0.59	679
Multifamily – Exterior[36]	Multifamily	0.00	3,338

HVAC Interactive Effects

Building Type	Demand Waste Heat Factor ($HVAC_d$)		Annual Energy Waste Heat Factor by Cooling/Heating Type ($HVAC_e$)			
	AC (Utility)	AC (PJM)	AC/ NonElec	AC/ ElecRes	Heat Pump	NoAC/ ElecRes
Office	0.35	0.32	0.10	-0.15	-0.06	-0.25
Retail	0.27	0.26	0.06	-0.17	-0.05	-0.23
Education	0.44	0.44	0.10	-0.19	-0.04	-0.29
Warehouse	0.22	0.23	0.02	-0.25	-0.11	-0.27
Other[56]	0.34	0.32	0.08	-0.18	-0.07	-0.26

Interactive Factor (HVACg) for Annual Fuel Savings

Project Type	Fuel Type	Impact (MMBtu/ΔkWh)
Large Retrofit (> 200 kW)	C&I Gas Heat	-0.00023
Large Retrofit (> 200 kW)	Oil	-0.00046
Small Retrofit (≤ 200 kW)	Gas Heat	-0.001075
Small Retrofit (> 200 kW)	Oil Heat	-0.000120

Sources

1. Device Codes and Rated Lighting System Wattage Table Retrofit Program, National Grid, January 13, 2015. https://www1.nationalgridus.com/files/AddedPDF/POA/RILightingRetrofit1.pdf

Lighting Controls

Lighting controls include occupancy sensors, daylight dimmer systems, and occupancy controlled hi-low controls for fluorescent, LED and HID fixtures. The measurement of energy savings is based on algorithms with key variables (i.e., coincidence factor, equivalent full load hours) provided through existing end-use metering of a sample of facilities or from other utility programs with experience with these measures (i.e., % of annual lighting energy saved by lighting control). For lighting controls, the baseline is a manual switch, based on the findings of the New Jersey Commercial Energy Efficient Construction Baseline Study.

Algorithms

$$\text{Energy Savings } \left(\frac{\text{kWh}}{\text{yr}}\right) = \text{kW}_c * \text{SVG} * \text{Hrs} * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = \text{kW}_c * \text{SVG} * \text{CF} * (1 + HVAC_d)$$

$$\text{Fuel Savings } \left(\frac{\text{MMBtu}}{\text{yr}}\right) = \text{kW}_c * \text{SVG} * (\text{Hrs}) * (\text{HVAC}_g)$$

Definition of Variables

SVG	= % of annual lighting energy saved by lighting control; refer to table by control type
kW_c	= kW lighting load connected to control
$HVAC_d$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary demand in reduced HVAC consumption resulting from decreased indoor lighting wattage.
$HVAC_e$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage.
$HVAC_g$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage.
CF	= Coincidence factor
Hrs	= Annual hours of operation prior to installation of controls

Summary of Inputs

Lighting Controls

Component	Type	Value	Source
kW_c	Variable	Load connected to control	Application
SVG	Fixed	Occupancy Sensor, Controlled Hi-Low Fluorescent Control, LED and controlled HID = 31% Daylight Dimmer System= 40%	4, 5, 6
CF	Fixed	See Table by Building in Performance Lighting Section Above	1
Hrs	Fixed	See Table by Building in Performance Lighting Section Above	1
$HVAC_d$	Fixed	See Table by Building Type in Performance Lighting Section Above	2
$HVAC_e$	Fixed	See Table by Building Type in Performance Lighting Table Above	2
$HVAC_g$	Fixed	See Table by Building Type in Performance Lighting Table Above	3

ECM 2 – Energy Management System – Plant Equipment and Terminal Equipment

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
2a	Energy Management System - Plant Equipment	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔				
2b	Energy Management System - Terminal Equipment	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔		✔	✔	✔	

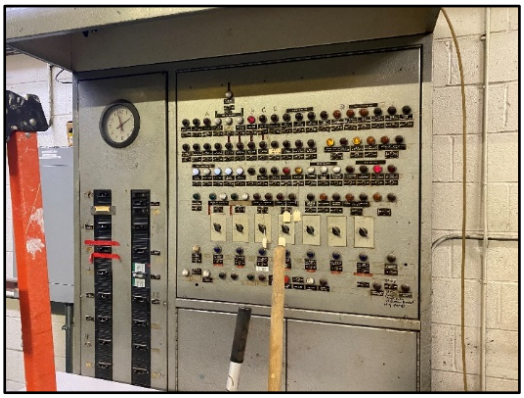
Background & Existing Conditions

A direct digital controls (DDC) energy management system (EMS) is an intelligent network of sensors, operators, processors, and a web-based user interface that controls and monitors electrical and mechanical building systems. Such systems provide automated control and monitoring of the heating, ventilation, lighting and other needs of a building or group of buildings. An effective EMS can provide facilities with monitoring and reporting of all utility consumption data.

Web based Building Automation Interface

By being able to monitor building systems from a central location, the operator is able to receive alerts and anticipate problems when a failure or troublesome condition occurs. Also, the data obtained from the EMS can then be used to produce a trend analysis and annual consumption forecasts. From these trends, energy saving strategies can be developed. Consumption can be managed through advanced control strategies such as time scheduling, optimum start and stop, night set-back, demand controlled ventilation, and peak demand limiting. Once trained, Operators are able to use the EMS to diagnose current building system problems as well as tailor specific energy savings strategies that utilize the full capability of the given EMS.


Existing controls at John Adams Middle School and Woodbrook Elementary School

Existing controls at James Madison Primary School and J.P. Stevens High School

Scope of Work

Andover/Schneider DDC hardware ranging from Infinity I , Infinity II to BACnet and Ecostruxure has been proposed for installation. The existing controls will be updated to Ecostruxure/Space Logic. Belimo actuators and valves for all end devices being replaced are recommended.

Scope of Work 2a – Plant Equipment

- This measure involves installing an open-protocol, web-based Energy Management system.
- New AS/ BACnet Router Controller
- New PC or Laptop for each building
- Control of Boiler Room, pumps, heat exchanger, OA sensor, central heating plant control
- Programming, graphics, check out, and training

Scope of Work 2b – Terminal Equipment

- Appropriate upgrades and controls to bring existing equipment into new BMS
- Demo of existing control equipment where appropriate
- Installation of new valves, actuators, sensors, Temp, CO2, RH in each occupied space
- Installation of necessary network and control wiring
- Programming, graphics, check out, training

ECM Calculations

Energy Savings from upgrading controls were calculated using the BPU protocols. The proposed controls maintain the occupied setpoint of 70F during occupied heating hours and 62F setpoint during unoccupied heating hours. Cooling setpoints are 72F during occupied hours and 77F during unoccupied hours. The calculations are shown below and in the Saving Calculation Spreadsheet attached.

Base EMS Savings							
BUILDING	SQFT	Weekly Occupied Hours [H]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	EFLHc	EFLHh	Boiler Heating Energy Savings (therms)
Edison High School	250,499	106	10,500,000	76.0%	466	901	10,135.9
Edison High School							0.0
Edison High School							0.0
John P. Stevens High School	220,287	113	10,461,000	87.0%	466	901	7,738.4
John P. Stevens High School							0.0
John P. Stevens High School							0.0
Herbert Hoover Middle School	132,625	102	7,144,000	81.6%	466	901	6,931.2
Herbert Hoover Middle School							0.0
Herbert Hoover Middle School							0.0
John Adams Middle School	93,041	98	6,300,000	76.2%	466	901	6,971.5
John Adams Middle School							0.0
John Adams Middle School							0.0
Thomas Jefferson Middle School	90,514	85	6,300,000	76.2%	466	901	8,301.9
Thomas Jefferson Middle School							0.0
Thomas Jefferson Middle School							0.0
Woodrow Wilson Middle School	102,122	105	6,123,000	79.6%	466	901	5,793.8
Woodrow Wilson Middle School							0.0
Woodrow Wilson Middle School							0.0
Benjamin Franklin Elementary School	56,975	85	3,663,000	79.3%	394	840	4,321.6
Benjamin Franklin Elementary School							0.0
Benjamin Franklin Elementary School							0.0
James Madison Intermediate School	44,000	88	3,266,000	78.6%	394	840	3,765.6
James Madison Intermediate School							0.0
James Madison Intermediate School							0.0
James Madison Primary School	46,000	88	2,500,000	86.1%	394	840	2,629.6
James Madison Primary School							0.0
James Madison Primary School							0.0
James Monroe Elementary School	67,800	88	750,000	85.7%	394	840	792.9
James Monroe Elementary School							0.0
James Monroe Elementary School							0.0

Base EMS Savings

BUILDING	SQFT	Weekly Occupied Hours [H]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	EFLHc	EFLHh	Boiler Heating Energy Savings (therms)
John Marshall Elementary School	62,517	88	4,847,000	75.1%	394	840	5,844.1
John Marshall Elementary School							0.0
John Marshall Elementary School							0.0
Lincoln Elementary School	55,315	88	2,980,500	75.2%	394	840	3,592.7
Lincoln Elementary School							0.0
Lincoln Elementary School							0.0
Lindeneau Elementary School	45,503	88	2,306,000	84.5%	394	840	2,471.4
Lindeneau Elementary School							0.0
Lindeneau Elementary School							0.0
Martin Luther King Elementary School	54,136	88	3,348,000	79.3%	394	840	3,826.9
Martin Luther King Elementary School							0.0
Martin Luther King Elementary School							0.0
Washington Elementary School	56,410	88	4,474,000	83.5%	394	840	4,854.4
Washington Elementary School							0.0
Washington Elementary School							0.0
Woodbrook Elementary School	85,954	88	4,663,000	80.7%	394	840	5,234.3
Woodbrook Elementary School							0.0
Woodbrook Elementary School							0.0
FDR Round Building	14,750	85					0.0
FDR Round Building							0.0
FDR Round Building							0.0
Edison Early Learning Center	7,297	63	600,000	77.1%	394	840	938.0
Edison Early Learning Center							0
Edison Early Learning Center							0

Alternate EMS Savings

BUILDING	SQFT	Weekly Occupied Hours [H]	Electric Heat Capacity (kW)	Split System Cooling (tons) [CAPhp]	Split System Cooling Efficiency (EER) [EERhp]	RTU Cooling (tons) [CAPrtu]	RTU Cooling Efficiency (EER) [EERrtu]	RTU Heating (Btu/hr) [CAPrtu]	RTU Heating Efficiency (%) [AFUEh]	ELFHc	ELFHh
FDR Round Building	14,750	85	109	0		0		0		394	840
Edison Early Learning Center	7,297	63		17	11.00	10	10.00	105,000	80%	394	840
Edison Education Center	30,000	88		7	11.00	65	10.00	1,370,000	80%	955	431

Alternate EMS Savings

BUILDING	Heat Pump Cooling Energy Savings (kWh)	RTU Cooling Energy Savings (kWh)	Electric Heat Heating Energy Savings (kWh)	Heat Pump Heating Energy Savings(kWh)	RTU Heating Energy Savings (therms)	Total Electric Savings (kWh)	Total Gas Savings (therms)
FDR Round Building	0	0	10,232	0	0	10,232	0
Edison Early Learning Center	1,311	849	0	2,237	158	4,396	158
Edison Education Center	937	10,043	0	338	796	11,318	796

Occupancy Controlled Thermostat Savings Calculation	
Th (F)	70
Tc (F)	72
Sh (F)	62
Sc (F)	77
H (hrs per week)	Varies
EFLHc (hrs per year)	Varies
EFLHh (hrs per year)	Varies
Ph (%)	3%
Pc (%)	6%

NJ BPU FY 2020 Protocols - Occupancy Controlled Thermostats

Algorithms

Cooling Energy Savings (kWh/yr) = $(((T_c * (H+5) + S_c * (168 - (H+5)))/168) - T_c) * (P_c * Cap_{hp} * 12 * EFLH_c/EER_{hp})$

Heating Energy Savings (kWh/yr) = $(T_h - ((T_h * (H+5) + S_h * (168 - (H+5)))/168)) * (P_h * Cap_{hp} * 12 * EFLH_h/EER_{hp})$

Heating Energy Savings (Therms/yr) = $(T_h - ((T_h * (H+5) + S_h * (168 - (H+5)))/168) * (P_h * Cap_h * EFLH_h/AFUE_h/100{,}000)$

Definition of Variables

T_h = Heating Season Facility Temp. (°F)
T_c = Cooling Season Facility Temp. (°F)
S_h = Heating Season Setback Temp. (°F)
S_c = Cooling Season Setup Temp. (°F)
H = Weekly Occupied Hours
Cap_{hp} = Connected load capacity of heat pump/AC (Tons) – Provided on Application.
Cap_h = Connected heating load capacity (Btu/hr) – Provided on Application.
$EFLH_c$ = Equivalent full load cooling hours
$EFLH_h$ = Equivalent full load heating hours
P_h = Heating season percent savings per degree setback
P_c = Cooling season percent savings per degree setup
$AFUE_h$ = Heating equipment efficiency – Provided on Application.
EER_{hp} = Heat pump/AC equipment efficiency – Provided on Application

12 = Conversion factor from Tons to kBtu/hr to acquire consumption in kWh.

168 = Hours per week.

7 = Assumed weekly hours for setback/setup adjustment period (based on 1 setback/setup per day, 7 days per week).

Summary of Inputs

Occupancy Controlled Thermostats

Component	Type	Value	Source
T_h	Variable		Application
T_c	Variable		Application
S_h	Fixed	T_h-5°	
S_c	Fixed	T_c+5°	
H	Variable		Application; Default of 84 hrs/week
Cap_{hp}	Variable		Application
Cap_h	Variable		Application
$EFLH_{c,h}$	Variable	See Table Below	1
P_h	Fixed	3%	2
P_c	Fixed	6%	2
$AFUE_h$	Variable		Application
EER_{hp}	Variable		Application

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Cooling	507	550	562
Low-rise, Heating	757	723	503
High-rise, Cooling	793	843	954
High-rise, Heating	526	395	219

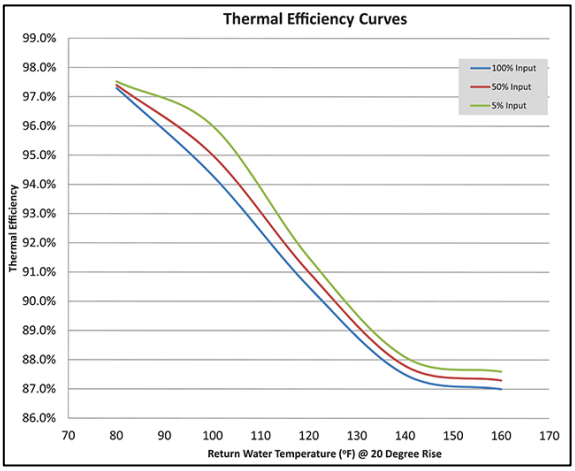
DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 3 – Boiler Replacement

EDISON TWP PUBLIC SCHOOLS		Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔	ECM evaluated but not included																				
✔	ECM included in the project																				
ECM #	ECM DESCRIPTION																				
3	Boiler Replacement		✔		✔	✔		✔				✔	✔	✔	✔	✔			✔		

Background & Existing Conditions

Old, oversized boiler systems have efficiencies in the range of 56%–75%. A condensing boiler hot water heating system can achieve efficiencies as high as 97%, converting nearly all the fuel to useful heat. The efficiency of the boiler increases at lower return water temperature. Lower return water temperatures allow more water vapor from the exiting flue gas to condense, allowing its latent heat of vaporization to be recovered.



Existing Conditions

Two (2) 8,367 MBh Cleaver Brooks gas boilers and one 6,695 MBH EASCO gas boiler serve the buildings heating load at John P. Stevens High School. The existing Cleaver Brooks boilers will be replaced with two (2) 5,000 MBh gas-fired condensing hot water boilers with polypropylene venting. The new boilers will tie into existing piping with new flues, pads, air separator, expansion tank, and chemical treatment.

Existing hot water boilers at J.P. Stevens High School

Washington Elementary School has two Weil-McLain 4,474 MBh force draft steam boilers that serve the building. The existing boilers will be replaced with two (2) 3,033 MBh steam gas-fired boilers. The new boilers will tie into existing piping and steam system. Pads will be expanded, clean, and painted as needed.

Existing steam boilers at Washington Elementary School

Two (2) 6,300 MBh EASCO hot water gas fired boilers served the heating load at John Adams Middle School. The existing boilers will be replaced two (2) with 3,000 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boilers will tie into existing piping and expansion tanks. Pads will be expanded, clean, and painted as needed.

Existing boilers at John Adams MS

Two (2) 6,300 MBh EASCO hot water gas fired boilers serve the heating load at Thomas Jefferson Middle School. The existing boilers will be replaced with two (2) 3,000 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boilers will tie into existing piping and expansion tanks. Pads will be expanded, clean, and painted as needed

Existing boilers at Thomas Jefferson MS

Two (2) 3,633 MBh Smith Cast Irion Hot water gas fired boilers serve the building heating load at Benjamin Franklin Elementary School. The existing boilers will be replaced with two (2) 3,500 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boiler will tie into existing piping and expansion tanks. The pads will be cleaned, expanded, and painted as needed.

Existing boilers at Benjamin Franklin ES

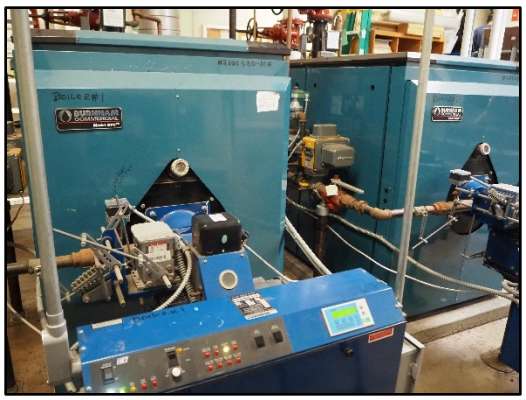
The old boiler room contains two (2) 2,100 MBh Hydro Therm boilers that served the old wing heating load at John Marshall Elementary School. The existing equipment will be replaced with two (2) 1,000 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boiler will tie into existing piping and expansion tanks. The pads will be cleaned, expanded, and painted as needed.

Existing boilers at John Marshall ES

Two (2) 3,103 MBh Weil McClain steam boilers with non-modulation burners serve a portion of the Lincoln Elementary Schools heating load. The existing equipment will be replaced with two 3,033 MBh steam gas-fired boilers. The new boilers will tie into existing piping and steam system. The pads will be cleaned, expanded, and painted as needed

Existing boilers at Lincoln ES

Two (2) existing non-condensing 1,858 MBh Burnham boilers serve the upper and lower wings of Lindeneau Elementary School. The existing boilers will be replaced with two (2) 1,000 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boiler will tie into existing piping and expansion tanks. The pads will be cleaned, expanded, and painted as needed.



Existing boilers at Lindeneau ES

Two (2) 3,348 MBh Smith Cast Iron hot water boilers with modualting burners serve the heating load at Martin Luther King Elementary School. The exisitng boilers will be replaced with two (2) 1,500 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boiler will tie into existing piping and expansion tanks. The pads will be cleaned, expanded, and painted as needed.

Existing boilers at MLK ES

Two (2) 300 MBh Slant/Fin hot water boilers serve the heating load at Edison Early Learning Center. The existing boilers will be replaced with two (2) 285 MBh hot water gas-fired condensing boilers with polypropylene venting. The new boiler will tie into existing piping and expansion tanks. The pads will be cleaned, expanded, and painted as needed.

Existing boilers at ELC

ECM Calculations

Energy Savings from the installation of high efficiency boilers were calculated using the BPU protocols.

Boiler Replacement Savings									
BUILDING	Input Boiler Capacity (mbh) [CAPin]	Equivalent Full Load Hours [EFLHh]	Boiler Baseline Efficiency [EFFb]	Boiler Proposed Efficiency [EFFq]	Proposed Plant Rated Input MBH (CAPYbi)	Calculated Annual Fuel Savings (Th)	35kW CHP Installation (% of Heat Load)	CHP REDUCTION OF HOT WATER LOAD (%)	Calculated Annual Fuel Savings (Th) with CHP
John P. Stevens High School	10,461	1,442	76.1%	87.0%	5,000	21,595	12.3%	12.3%	18,935
John Adams Middle School	6,300	901	76.2%	87.0%	3,000	8,056		0.0%	8,056
Thomas Jefferson Middle School	6,300	833	76.2%	87.0%	3,000	7,452		0.0%	7,452
Benjamin Franklin Elementary School	3,663	1,008	79.3%	87.0%	3,500	3,567		0.0%	3,567
James Madison Intermediate School	3,266	811	78.6%	87.0%	1,500	2,838		0.0%	2,838
John Marshall Elementary School	4,847	924	75.1%	87.0%	1,000	7,067		0.0%	7,067
Lincoln Elementary School	3,103	987	75.2%	83.5%	3,033	3,398		0.0%	3,398
Lindeneau Elementary School	1,858	1,008	84.5%	87.0%	1,000	546		0.0%	546
Martin Luther King Elementary School	3,348	941	79.3%	87.0%	1,500	3,075		0.0%	3,075
Washington Elementary School	4,474	924	75.5%	83.5%	3,033	4,397		0.0%	4,397
Woodbrook Elementary School	3,663	672	79.9%	87.0%	1,500	2,176		0.0%	2,176
Edison Early Learning Center	600	1,134	77.1%	87.0%	285	870		0.0%	870

Algorithms

Fuel Savings (MMBtu/yr) = Cap_{in} * $EFLH_h$ * ((Eff_q/Eff_b)-1) / 1000 kBtu/MMBtu

Definition of Variables

Cap_{in} = Input capacity of qualifying unit in kBtu/hr

$EFLH_h$ = The Equivalent Full Load Hours of operation for the average unit during the heating season in hours

Eff_b = Boiler Baseline Efficiency

Eff_q = Boiler Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Boilers

Component	Type	Value	Source
Cap_{in}	Variable		Application
$EFLH_h$	Fixed	See Table Below	1
Eff_b	Variable	See Table Below	2
Eff_q	Variable		Application

$EFLH_h$ Table

Facility Type	Heating EFLH
Assembly	603
Auto repair	1910
Dormitory	465
Hospital	3366
Light industrial	714
Lodging – Hotel	1077
Lodging – Motel	619
Office – large	2034
Office – small	431
Other	681
Religious worship	722

Facility Type	Heating EFLH
Restaurant – fast food	813
Restaurant – full service	821
Retail – big box	191
Retail – Grocery	191
Retail – small	545
Retail – large	2101
School – Community college	1431
School – postsecondary	1191
School – primary	840
School – secondary	901
Warehouse	452

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Heating	757	723	503
High-rise, Heating	526	395	219

Baseline Boiler Efficiencies (Eff_b)

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Hot Water – Gas fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	82% AFUE 80% Et 82% Ec
Hot Water – Oil fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	84% AFUE 82% Et 84% Ec
Steam – Gas fired	< 300	80% AFUE
Steam – Gas fired, all except natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, all except	> 2,500	79% Ec

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Steam – Gas fired, natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, natural draft	> 2,500	79% Ec
Steam – Oil fired	< 300	82% AFUE
	≥ 300 and ≤ 2,500	81% Et
	> 2,500	81% Ec

Sources

1. New York State Joint Utilities, *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, V7, April 2019. Appendix G – Equivalent Full-Load Hours (EFLH), For Heating and Cooling. P. 675-680. EFLH values for NYC due to proximity to NJ.
2. ASHRAE Standards 90.1-2016. *Energy Standard for Buildings Except Low Rise Residential Buildings*; available at: https://www.ashrae.org/standards-research--technology/standards--guidelines. Table 6.8.1-6

ECM 4 – Steam Trap Replacement

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
4 Steam Trap Replacement	✔											✔			✔					

Background & Existing Conditions

Mechanical traps are prone to failure as they age, resulting in large steam losses and requiring substantial maintenance. Steam traps separate the steam system from the condensate system. Traditional steam traps can fail in the open or closed position. When a steam trap fails in the open or leaking-by position, some or all of the energy that was added at the boiler is lost into the condensate return system. The energy contained in steam is only utilized when it condenses in a heat exchanger (radiator, convector, hot water heater, AHU coil, etc.) and releases its latent heat to the process. It is at this point the steam trap should allow this condensate into the condensate return system to return to the boiler. As mentioned above, a leaking trap still allows steam to flow through the heat exchange device it serves and will typically not affect its heating capacity. For this reason, leaking traps are rarely discovered without performing specific tests on the trap. Conversely, a steam trap that fails in the closed position does not allow the condensate to enter the condensate return system. As a result, condensate backs up into the heat exchange device it serves, thereby first reducing, then eliminating, its heating capacity. Plugged traps are often identified through “cold calls” and repaired. Replacing or repairing failed traps will improve the efficiency of the steam distribution system and save energy.

Scope of Work

Facility / Building Name	Steam Trap Retrofit							
	EXIST	DNRT	RTCC	RFRK	RTTT	RTFT	RTIB	RTTD
Edison HS	233	0	169	0	1	57	5	1
Washington es	89	0	80	0	0	9	0	0
Lincoln es	109	0	86	9	0	11	2	1
Stevens HS	0	0	0	0	0	0	0	0
Edison Education Center	0	0	0	0	0	0	0	0
Herbert Hoover MS	0	0	0	0	0	0	0	0
Building and Grounds	0	0	0	0	0	0	0	0
James Monroe ES	0	0	0	0	0	0	0	0
Woodrow Wilson MS	0	0	0	0	0	0	0	0
Woodbrook ES	0	0	0	0	0	0	0	0
John Adams MS	0	0	0	0	0	0	0	0
James Madison IS	0	0	0	0	0	0	0	0
FDR Round Bldg	0	0	0	0	0	0	0	0
James Madison PS	0	0	0	0	0	0	0	0
MLK ES	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
Totals	431	0	335	9	1	77	7	2

Steam Trap Retrofit Code Key		**Quantity**
EXIST	Existing Traps	431
DNRT	Do Not Retrofit	0
RTCC	Retrofit Existing Thermostatic Trap with new Cage Unit and Cover	335
RFRK	Repair Float and Thermostatic Trap with Repair Kit	9
RTTT	Replace Existing Trap with new Thermostatic Trap	1
RTFT	Replace Existing Trap with new Float & Thermostatic Trap	77
RTIB	Replace Existing Trap with new Inverted Bucket Trap	7
RTTD	Replace Existing Trap with new Thermodynamic Trap	2

ECM Calculations

See Saving Calculations in Supporting Documents for more details.

Steam Trap Fuel Savings

BUILDING NAME	Steam Traps			
	Number of Traps	Boiler Efficiency	Steam Pressure at Trap (psig)	Fuel Savings (Therms)
Edison High School	170	76.0%	5.0	11,298
Lincoln Elementary School	109	75.2%	5.0	4,631
Washington Elementary School	89	83.5%	5.0	2,447

ECM 5 – Variable Frequency Drives on HW Pumps

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
5 Variable Frequency Drives on HW Pumps		✔	✔	✔	✔		✔	✔	✔		✔					✔				

Background & Existing Conditions

Premium efficiency electric motors will help optimize fan and pump efficiency, reduce electrical power consumption and improve system reliability. These motors are designed to run cooler, last longer, and require less maintenance than the existing standard efficiency motors. Premium efficiency motors can be as high as 95% efficient (as opposed to standard efficiency motors of 78% to 88%) and are capable of operating at varying speeds allowing Variable Frequency Drive (VFD) installations where applicable.

Existing Conditions

Existing Hot Water Pumps at J.P. Stevens HS and Thomas Jefferson Middle School


Existing Pumps at Benjamin Franklin Middle School and James Madison Intermediate School

Scope of Work

Pump + VFD Scope of Work				
BUILDING	**SQFT**	**CATEGORY**	**QUANTITY**	**HP**
John P. Stevens High School	220,287	Heating Hot Water Pump	2	1.0
		Heating Hot Water Pump	4	2.0
		Heating Hot Water Pump	1	3.0
		Heating Hot Water Pump	3	5.0
		Heating Hot Water Pump	3	7.5
Herbert Hoover Middle School	132,625	Heating Hot Water Pump	2	15.0
John Adams Middle School	93,041	Heating Hot Water Pump	2	15
Thomas Jefferson Middle School	90,514	Heating Hot Water Pump	1	10
		Heating Hot Water Pump	2	5.0
Benjamin Franklin Elementary School	56,975	Heating Hot Water Pump	2	5
James Madison Intermediate School	44,000	Heating Hot Water Pump	2	7.5
James Madison Primary School	46,000	Heating Hot Water Pump	2	7.5
John Marshall Elementary School	62,517	Heating Hot Water Pump	2	5
Woodbrook Elementary School	85,954	Heating Hot Water Pump	2	5

The constant volume hot water pumps at J.P. Stevens High School will be replaced with new pumps, motors and VFDs. Other sites will add VFDs to the exiting hot water pumps and motors.

ECM Calculations

Energy Savings from the installation of variable speed drives on HW Pumps were calculated using BPU protocols. The calculations are shown below.

Pump VFD Savings

BUILDING	SQFT	SYSTEM AND SERVICE	QTY	MOTOR HP	LF	CF	IFvfd
John P. Stevens High School	220,287	Heating Hot Water Pump	2	1.0	0.75	0.74	1.0
		Heating Hot Water Pump	4	2.0	0.75	0.74	1.0
		Heating Hot Water Pump	1	3.0	0.75	0.74	1.0
		Heating Hot Water Pump	3	5.0	0.75	0.74	1.0
		Heating Hot Water Pump	3	7.5	0.75	0.74	1.0
Herbert Hoover Middle School	132,625	Heating Hot Water Pump	2	15	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0
John Adams Middle School	93,041	Heating Hot Water Pump	2	15	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0
Thomas Jefferson Middle School	90,514	Heating Hot Water Pump	1	10	0.75	0.74	1.0
		Heating Hot Water Pump	2	5	0.75	0.74	1.0
					0.75	0.74	1.0
Benjamin Franklin Elementary School	56,975	Heating Hot Water Pump	2	5	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0
James Madison Intermediate School	44,000	Heating Hot Water Pump	2	7.5	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0
James Madison Primary School	46,000	Heating Hot Water Pump	2	7.5	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	0.9
John Marshall Elementary School	62,517	Heating Hot Water Pump	2	5	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0
Woodbrook Elementary School	85,954	Heating Hot Water Pump	2	5	0.75	0.74	1.0
					0.75	0.74	1.0
					0.75	0.74	1.0

Pump VFD Savings								
BUILDING	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)	TOTAL ELECTRIC SAVINGS (kWh)
John P. Stevens High School	1,548.00	0.096	0.10	1,548	0.10	3.55	1,548	57,276
	1,548.00	0.096	0.77	12,384	0.77		12,384	
	1,548.00	0.096	0.29	4,644	0.29		4,644	
	1,548.00	0.096	0.96	15,480	0.96		15,480	
	1,548.00	0.096	1.44	23,220	1.44		23,220	
Herbert Hoover Middle School	1,548.00	0.096	1.44	23,220	1.44	1.44	23,220	23,220
			0.00	0	0.00		0	
			0.00	0	0.00		0	
John Adams Middle School	1,548.00	0.096	1.44	23,220	1.44	1.44	23,220	23,220
			0.00	0	0.00		0	
			0.00	0	0.00		0	
Thomas Jefferson Middle School	1,548.00	0.096	0.96	15,480	0.96	1.44	15,480	23,220
	1,548.00	0.096	0.48	7,740	0.48		7,740	
			0.00	0	0.00		0	
Benjamin Franklin Elementary School	1,548.00	0.096	0.48	7,740	0.48	0.48	7,740	7,740
			0.00	0	0.00		0	
			0.00	0	0.00		0	
James Madison Intermediate School	1,548.00	0.096	0.72	11,610	0.72	0.72	11,610	11,610
			0.00	0	0.00		0	
			0.00	0	0.00		0	
James Madison Primary School	1,548.00	0.096	0.72	11,610	0.72	0.72	11,610	11,610
			0.00	0	0.00		0	
			0.00	0	0.00		0	
John Marshall Elementary School	1,548.00	0.096	0.48	7,740	0.48	0.48	7,740	7,740
			0.00	0	0.00		0	
			0.00	0	0.00		0	
Woodbrook Elementary School	1,548.00	0.096	0.48	7,740	0.48	0.48	7,740	7,740
			0.00	0	0.00		0	
			0.00	0	0.00		0	

Algorithms

Energy Savings (kWh) = $0.746*HP*HRS*(ESF/\eta_{motor})$

Demand Savings (kW) = $0.746*HP*(DSF/\eta_{motor})$

Definitions of Variables

HP = nameplate motor horsepower or manufacturer spec. sheet per application

η_{motor} = Motor efficiency at the peak load. Motor efficiency varies with load. At low loads relative to the rated hp (usually below 50%) efficiency often drops dramatically.

ESF = Energy Savings Factor. The energy savings factor is calculated by determining the ratio of the power requirement for baseline and VFD control at peak conditions.

DSF = Demand Savings Factor. The demand savings factor is calculated by determining the ratio of the power requirement for baseline and VFD control at peak conditions

HRS = annual operating hours

Variable Frequency Drives

Component	Type	Value	Source
Motor HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
η_{motor}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Connecticut Light and Power
DSF	Variable	See Table Below	Connecticut Light and Power
HRS	Variable	>2,000	Application

VFD Savings Factors

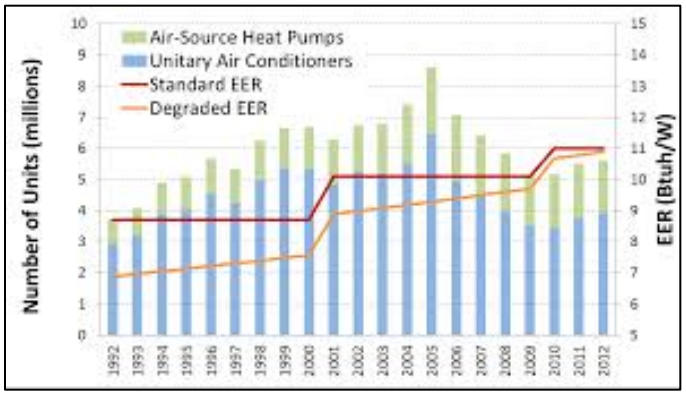
Component	Energy Savings Factor, ESF	Demand Savings Factor, DSF
Airfoil/Backward Inclined Fans	0.475	0.448
Forward Curved Fans	0.240	0.216
Chilled Water Pumps	0.580	0.201
Cooling Tower Fans	0.580	0.000

ECM 6 – Rooftop Unit Replacement

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

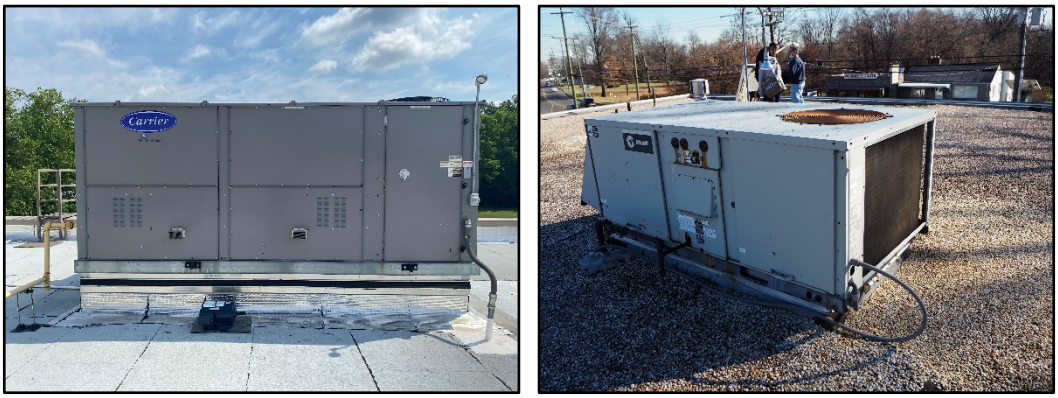
ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
6	Rooftop Unit Replacement			✔											✔	✔			✔	✔	



Many commercial buildings are operating with older and inefficient HVAC systems. The average life expectancy of commercial HVAC RTU equipment is 10 to 15 years—which means that many commercial buildings are ready for new natural gas rooftop units. Technology improvements and demand have led to greater energy efficiency and more choices in systems. Installing new, higher efficiency units will provide energy savings as well as deliver enhanced technology and controls of the RTUs when compared to the existing units.

Existing Conditions

Existing roof top units at Herbert Hoover Middle School and Edison Education Center



Existing rooftop unit at Washington Elementary School and Edison ELC

Scope of Work

The following RTUs will be replaced with high efficiency constant volume units:

RTU Replacement Scope of Work				
BUILDING	**EXISTING MANUFACTURER**	**EXISTING MODEL**	**TONS**	**QUANTITY**
Herbert Hoover Middle School	Lennox	LCA240SN1G	20.0	1
Martin Luther King Elementary School	Unknown	Unknown heat pump	5.0	2
Washington Elementary School	Trane	YSC092A3RHA11C0B0C10000000	7.5	2
Edison Early Learning Center	Trane	N/A	5.0	2
Edison Education Center	Lennox	LGA120H2BH3Y	10.0	1
	Carrier	48HEE003G--301HQ	2.0	1
	Carrier	48HCEA04A2A5A0A0A0	3.0	1
	Lennox	GCS16-261-50-5P	2.0	1
	Lennox	GCS16-513-75-6Y	4.0	1
	Lennox	GCS16-413-75-1Y	3.0	1
	Lennox	GCS16-413-75-1Y	3.0	1
	Lennox	GCS16-413-75-1Y	3.0	1
	Lennox	GCS16-1353-270-3Y	10.0	1
	Lennox	LGA120H2BH3Y	10.0	1
	Lennox	GCS16-513-125-1Y	4.0	1
	Lennox	GCS16-513-125-1Y	4.0	1
	Lennox	GCS16-413-75-1Y	3.0	1

ECM Calculations

Energy Savings from the installation of high efficiency rooftop units were calculated using BPU protocols. The calculations are shown below.

RTU Replacement - Heating Savings											
BUILDING NAME	**SYSTEM**	**Qty**	**Estimated Existing Efficiency (EFFb)**	**Efficiency Units**	**Baseline RTU Rated Input MBH**	**Baseline Plant Rated Input MBH (CAPYbi)**	**Qualifying RTU Capacity MBH**	**Qualifying Plant Capacity (CAPYqi)**	**Qualifying RTU Efficiency (EFFq)**	**Efficiency Units**	**EFLH**
Herbert Hoover Middle School	LCA240SN1G	1				0		0			
Martin Luther King Elementary School	Unknown heat pump	2				0		0			
Washington Elementary School	YSC092A3RHA11C0B0C10000000	2	76.2%	Et	200	400	200	400	80%	Et	840
Edison Early Learning Center	YCD060C1H0BE	1	72.1%	Et	135	135	135	135	80%	Et	840
Edison Education Center	LGA120H2BH3Y	1	74.2%	Et	240	240	240	240	80%	Et	431
	48HEE003G--301HQ	1	74.2%	Et	50	50	50	50	80%	Et	431
	48HCEA04A2A5A0A0A0	1	75.1%	Et	115	115	115	115	80%	Et	431
	GCS16-261-50-5P	1	72.6%	Et	50	50	50	50	80%	Et	431
	GCS16-513-75-6Y	1	72.6%	Et	75	75	75	75	80%	Et	431
	GCS16-413-75-1Y	1	74.2%	Et	75	75	75	75	80%	Et	431
	GCS16-413-75-1Y	1	74.2%	Et	75	75	75	75	80%	Et	431
	GCS16-413-75-1Y	1	74.2%	Et	75	75	75	75	80%	Et	431
	GCS16-1353-270-3Y	1	74.2%	Et	270	270	270	270	80%	Et	431
	LGA120H2BH3Y	1	74.2%	Et	240	240	240	240	80%	Et	431
	GCS16-513-125-1Y	1	72.7%	Et	125	125	125	125	80%	Et	431
	GCS16-513-125-1Y	1	72.7%	Et	125	125	125	125	80%	Et	431
	GCS16-413-75-1Y	1	74.2%	Et	75	75	75	75	80%	Et	431

RTU Replacement - Heating Savings						
BUILDING NAME	Conversion of BTU to kWh	Conversion of BTU to therms	Annual Electric Savings (kWh)	Baseline Gas Use (Therms)	Proposed Gas Use (Therms)	Annual Gas Savings (Therms)
Herbert Hoover Middle School	3,412	100,000	-	-	-	-
Martin Luther King Elementary School	3,412	100,000	-	-	-	-
Washington Elementary School	3,412	100,000	-	4,407	4,200	207
Edison Early Learning Center	3,412	100,000	-	1,572	1,418	154
Edison Education Center	3,412	100,000	-	1,394	1,293	101
	3,412	100,000	-	290	269	21
	3,412	100,000	-	660	620	40
	3,412	100,000	-	297	269	27
	3,412	100,000	-	445	404	41
	3,412	100,000	-	436	404	32
	3,412	100,000	-	436	404	32
	3,412	100,000	-	436	404	32
	3,412	100,000	-	1,568	1,455	114
	3,412	100,000	-	1,394	1,293	101
	3,412	100,000	-	741	673	67
	3,412	100,000	-	741	673	67
	3,412	100,000	-	436	404	32

Demand Control Ventilation Savings												
BUILDING	Quantity	Tons per Unit	Existing OA (cfm)	CESF (kWh/CFM)	CDSF (kW/CFM)	HSF (MMBtu/CFM)	DCV Electric Savings (kWh)	DCV Demand Savings (kW)	DCV Gas Savings (Th)	Total Electric Savings (kWh)	Total Demand Savings (kW)	Total Gas Savings (Th)
Herbert Hoover Middle School	1	20	2,400	1.079	0.0013	0.0290	2,590	3.1	696	2,590	3.1	696
Martin Luther King Elementary Scho	1	5	600	1.079	0.0013	0.0290	5,747	0.8	-	5,747	0.8	0
Washington Elementary School	1	8	900	1.079	0.0013	0.0290	971	1.2	261	971	1.2	261
Edison Early Learning Center	1	5	600	1.079	0.0013	0.0290	647	0.8	174	647	0.8	174
Edison Education Center	1	10	1,200	2.544	0.0013	0.0145	3,053	2	174	18,622	10	1,061
	1	2	240	2.544	0.0013	0.0145	611	0	35			
	1	3	360	2.544	0.0013	0.0145	916	0	52			
	1	2	240	2.544	0.0013	0.0145	611	0	35			
	1	4	480	2.544	0.0013	0.0145	1,221	1	70			
	1	3	360	2.544	0.0013	0.0145	916	0	52			
	1	3	360	2.544	0.0013	0.0145	916	0	52			
	1	3	360	2.544	0.0013	0.0145	916	0	52			
	1	10	1,200	2.544	0.0013	0.0145	3,053	2	174			
	1	10	1,200	2.544	0.0013	0.0145	3,053	2	174			
	1	4	480	2.544	0.0013	0.0145	1,221	1	70			
	1	4	480	2.544	0.0013	0.0145	1,221	1	70			
	1	3	360	2.544	0.0013	0.0145	916	0	52			

RTU Replacement - Total Savings							
BUILDING NAME	SYSTEM	Annual Electric Savings (kWh)	Total Electric Savings (kWh)	Annual Demand Savings (kW)	Total Demand Savings (kW)	Annual Gas Savings (Therms)	Total Gas Savings (Therms)
Herbert Hoover Middle School	LCA240SN1G	7,711	7,711	7.7	7.7	696	696
Martin Luther King Elementary School	Unknown heat pump	6,007	6,007	1.1	1.1	-	-
Washington Elementary School	YSC092A3RHA11C0B0C10000000	1,776	1,776	2.2	2.2	468	468
Edison Early Learning Center	YCD060C1H0BE	1,574	1,574	1.7	1.7	328	328
Edison Education Center	LGA120H2BH3Y	6,608	44,497	2	17.1	275	1,767
	48HEE003G--301HQ	2,306		1		56	
	48HCEA04A2A5A0A0A0	1,934		1		92	
	GCS16-261-50-5P	1,677		1		62	
	GCS16-513-75-6Y	3,354		1		111	
	GCS16-413-75-1Y	2,515		1		84	
	GCS16-413-75-1Y	2,515		1		84	
	GCS16-413-75-1Y	2,515		1		84	
	GCS16-1353-270-3Y	5,240		2		288	
	LGA120H2BH3Y	6,608		2		275	
	GCS16-513-125-1Y	3,354		1		137	
	GCS16-513-125-1Y	3,354		1		137	
	GCS16-413-75-1Y	2,515		1		84	

Algorithms

Air Conditioning Algorithms:

$$\text{Energy Savings (kWh/yr)} = N * \text{Tons} * 12\ \text{kBtuh/Ton} * (1/EER_b - 1/EER_q) * EFLH_c$$

$$\text{Peak Demand Savings (kW)} = N * \text{Tons} * 12\ \text{kBtuh/Ton} * (1/EER_b - 1/EER_q) * CF$$

Definition of Variables

N = Number of units

Tons = Rated cooling capacity of unit.This value comes from ARI/AHRI or AHAM rating or manufacturer data.

EER_b = Energy Efficiency Ratio of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER should be used in place of EER.

COP_b = Coefficient of Performance of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

EER_q = Energy Efficiency Ratio of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 (5.4 tons) BtuH, SEER should be used in place of EER.

COP_q = Coefficient of Performance of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 BtuH

(5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window. This value is based on existing measured usage and determined as the average number of operating hours during the peak window period.

$EFLH_{c\ or\ h}$ = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off-peak periods.

Summary of Inputs

HVAC and Heat Pumps

Component	Type	Value	Source
Tons	Variable	Rated Capacity, Tons	Application
EER_b	Variable	See Table below	1
EER_q	Variable	ARI/AHRI or AHAM Values	Application
CF	Fixed	50%	2
$EFLH_{(c\ or\ h)}$	Variable	See Tables below	3

HVAC Baseline Efficiencies Table – New Construction/EUL/RoF

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Unitary HVAC/Split Systems and Single Package, Air Cooled	
<=5.4 tons, split	14 SEER
<=5.4 tons, single	14 SEER
>5.4 to 11.25 tons	11.0 EER, 12.7 IEER
>11.25 to 20 tons	10.8 EER, 12.2 IEER
> 21 to 63 tons	9.8 EER, 11.4 IEER
>63 Tons	9.5 EER, 11.0 IEER
Air Cooled Heat Pump Systems, Split System and Single Package	
<=5.4 tons, split	14 SEER, 8.2 HSPF
<=5.4 tons, single	14 SEER, 8.0 HSPF
>5.4 to 11.25 tons	10.8 EER, 12 IEER, 3.3 heating COP
>11.25 to 20 tons	10.4 EER, 11.4 IEER, 3.2 heating COP
>= 21	9.3 EER, 10.4 IEER, 3.2 heating COP

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Water Source Heat Pumps (water to air, water loop)	
<=1.4 tons	12.2 EER, 4.3 heating COP
>1.4 to 5.4 tons	13.0 EER, 4.3 heating COP
>5.4 to 11.25 tons	13.0 EER, 4.3 heating COP
Ground Water Source Heat Pumps <=11.25 tons	18.0 EER, 3.7 heating COP
Ground Source Heat Pumps (brine to air, ground loop) <=11.25 tons	14.1 EER, 3.2 heating COP
Package Terminal Air Conditioners[27]	14.0 – (0.300 * Cap/1,000), EER
Package Terminal Heat Pumps	14.0 – (0.300 * Cap/1,000), EER 3.7 – (0.052 * Cap/1,000), heating COP
Single Package Vertical Air Conditioners	
<=5.4 tons	10.0 EER
>5.4 to 11.25 tons	10.0 EER
>11.25 to 20 tons	10.0 EER
Single Package Vertical Heat Pumps	
<=5.4 tons	10.0 EER, 3.0 heating COP
>5.4 to 11.25 tons	10.0 EER, 3.0 heating COP
>11.25 to 20 tons	10.0 EER, 3.0 heating COP

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

Dual Enthalpy Economizers

The following algorithm details savings for dual enthalpy economizers. They are to be used to determine electric energy savings between baseline standard units and the high efficiency units promoted in the program. The baseline condition is assumed to be a rooftop unit with fixed outside air (no economizer). The high efficiency units are equipped with sensors that monitor the enthalpy of outside air and return air and modulate the outside air damper to optimize energy performance.

Algorithms

Electric energy savings (kWh/yr) = N * Tons * (ΔkWh/ton)

Peak Demand Savings (kW) = 0^{38} kW

Definition of Variables

N = Number of units

Tons = Rated capacity of the cooling system retrofitted with an economizer

ΔkWh/ton = Stipulated per building type electricity energy savings per ton of cooling system retrofitted with an economizer

Summary of Inputs

Dual Enthalpy Economizers

Component	Type	Value	Source
N	Variable		Application
Tons	Variable	Rated Capacity, Tons	Application
ΔkWh/ton	Fixed	See Table Below	1

Savings per Ton of Cooling System

Building Type	Savings (ΔkWh/ton)
Assembly	27
Big Box Retail	152
Fast Food Restaurant	39
Full Service Restaurant	31
Light Industrial	25
Primary School	42
Small Office	186
Small Retail	95
Religious	6
Warehouse	2
Other	61

Algorithms

Fuel Savings (MMBtu/yr) = Cap_{in} * $EFLH_h$ * ((Eff_q/Eff_b)-1) / 1000 kBtu/MMBtu

Definition of Variables

Cap_{in} = Input capacity of qualifying unit in kBtu/hr

$EFLH_h$ = The Equivalent Full Load Hours of operation for the average unit during the heating season in hours

Eff_b = Furnace Baseline Efficiency

Eff_q = Furnace Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Furnaces

Component	Type	Value	Source
Cap_{in}	Variable		Application
$EFLH_h$	Fixed	See Table Below	1
Eff_q	Variable		Application
Eff_b	Fixed	See Table Below	2

$EFLH_h$ Table

Facility Type	Heating EFLH
Assembly	603
Auto repair	1910
Dormitory	465
Hospital	3366
Light industrial	714
Lodging – Hotel	1077
Lodging – Motel	619
Office – large	2034
Office – small	431
Other	681
Religious worship	722

Facility Type	Heating EFLH
Restaurant – fast food	813
Restaurant – full service	821
Retail – big box	191
Retail – Grocery	191
Retail – small	545
Retail – large	2101
School – Community college	1431
School – postsecondary	1191
School – primary	840
School – secondary	901
Warehouse	452

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Heating	757	723	503
High-rise, Heating	526	395	219

Baseline Furnace Efficiencies (Eff_b)

Furnace Type	Size Category (kBtu input)	Standard 90.1-2016
Gas Fired	< 225 ≥ 225	78% AFUE or 80% Et 80% Et
Oil Fired	< 225 ≥ 225	78% AFUE 81% Et

ECM 7 – Unit Ventilator Replacement

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
7	Unit Ventilator Replacement					✔						✔				✔		✔	✔		

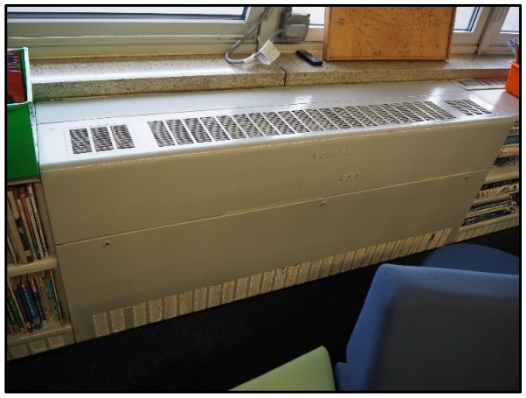
Background & Existing Conditions

New unit ventilators will improve classroom indoor air quality. Superior indoor air quality can help ensure a healthier and higher performance learning environment for students and staff, and the choice of ventilation equipment plays a big role in the quality of the indoor air. Proper ventilation with outdoor air is a key component for good indoor air quality in schools and classrooms since indoor air may be two to five times more polluted than outdoor air, and there are large populations of children who may be more susceptible to indoor pollutants than the general population.

Unit Ventilator

The high occupant densities of schools and classrooms often make it challenging for building designers to incorporate ventilation systems that provide adequate outdoor ventilation air while providing buildings with good indoor air quality and minimized costs.

Existing Conditions




Existing unit ventilators at Washington ES and Edison ELC


Existing unit ventilators at John Marshall ES and FDR Round Building

Scope of Work

The following unit ventilators will be replaced with high efficiency units:

Unit Ventilator Replacement Scope of Work		
BUILDING	**PROPOSED**	**QUANTITY**
Thomas Jefferson Middle School	HW heat	62
	Electrical upgrades	0
John Marshall Elementary School	HW heat	36
	Electrical upgrades	0
Washington Elementary School	Steam heat	26
	VRF heat	10
	Electrical upgrades	0
FDR Round Building	VRF heat	15
	Electrical upgrades	0

ECM Calculations

Energy Savings from the installation of unit ventilators were calculated using BPU protocols.

Unit Ventilator Replacement Savings									
BUILDING	UNIT TAG	NUMBER OF UNITS	FAN MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)	LF	CF	IFvfd	HRS
Thomas Jefferson Middle School	HW UVs	62	0.25	80.0%	85.5%	0.75	0.74	0.9	2745
Thomas Jefferson Middle School						0.75	0.74	1.0	
Thomas Jefferson Middle School						0.75	0.74	1.0	
John Marshall Elementary School	HW UVs	36	0.25	80.0%	85.5%	0.75	0.74	0.9	2745
						0.75	0.74	1.0	
						0.75	0.74	1.0	
Washington Elementary School	Steam UVs	26	0.25	80.0%	85.5%	0.75	0.74	0.9	2745
	Electric UVs	10	0.25	80.0%	85.5%	0.75	0.74	0.9	2745
						0.75	0.74	1.0	
FDR Round Building	Electric UVs	15	0.25	80.0%	85.5%	0.75	0.74	0.9	2745
						0.75	0.74	1.0	
						0.75	0.74	1.0	

Unit Ventilator Replacement Savings									
BUILDING	ΔkW	DEMAND SAVINGS (kW)	ELECTRIC SAVINGS (kWh)	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Thomas Jefferson Middle School	0.01	0.62	1,723	2,033	0.285	4.4	31,512	5.0	33,234
Thomas Jefferson Middle School	0.00	0.00	0			0.0	0	0.0	
Thomas Jefferson Middle School	0.00	0.00	0			0.0	0	0.0	
John Marshall Elementary School	0.01	0	1,000	2,033	0.285	2.6	18,297	2.9	19,297
	0.00	0	0			0.0	0	0.0	
	0.00	0	0			0.0	0	0.0	
Washington Elementary School	0.01	0	722	2,033	0.285	1.9	13,215	2.1	13,937
	0.01	0	278			0.0	0	0.1	
	0.00	0	0			0.0	0	0.0	
FDR Round Building	0.01	0	417	2,033	0.285	1.1	7,624	1.2	8,041
	0.00	0	0			0.0	0	0.0	
	0.00	0	0			0.0	0	0.0	

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
LF	Fixed	0.75	1
η_{base}	Fixed	ASHRAE 90.1-2016 Baseline Efficiency Table	ASHRAE
η_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application
HP = Nameplate motor horsepower or manufacturer specification sheet per application
ESF = Energy Savings Factor (kWh/year per HP)
DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
DSF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3

The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables
ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

Electric HVAC Systems

The measurement of energy and demand savings for C/I Efficient HVAC program for Room AC, Central AC, and air cooled DX is based on algorithms. (Includes split systems, air to air heat pumps, packaged terminal systems, water source heat pumps, central DX AC systems, ground water or ground source heat pumps)

Algorithms

Air Conditioning Algorithms:

Demand Savings = (BtuH/1000) X ($1/EER_b$-$1/EER_q$) X CF

Energy Savings = (BtuH/1000) X ($1/EER_b$-$1/EER_q$) X EFLH

Definition of Variables

BtuH = Cooling capacity in Btu/Hour – This value comes from ARI/AHRI or AHAM rating or manufacturer data.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window. This value will be based on existing measured usage and determined as the average number of operating hours during the peak window period.

EFLH = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off peak periods. This value will be determined by existing measured data of kWh during the period divided by kW at design conditions.

HVAC and Heat Pumps

Component	Type	Value	Source
BtuH	Variable	ARI/AHRI or AHAM or Manufacturer Data	Application
EER_b	Variable	See Table below	Collaborative agreement and C/I baseline study
EER_q	Variable	ARI/AHRI or AHAM Values	Application
CF	Fixed	67%	Engineering estimate
EFLH	Fixed	HVAC 1,131 HP cooling 381 HP heating 800	JCP&L metered data[8]

HVAC Baseline Table

Equipment Type	Baseline = ASHRAE Std. 90.1 - 2007
Unitary HVAC/Split Systems, Air Cooled	
· <=5.4 tons:	13 SEER
· >5.4 to 11.25 tons	11 EER
· >11.25 to 20 tons	10.8 EER
.> 21 to 63 tons	9.8 EER
>63 Tons	9.5 EER

Capital Improvement 8 – Addition of Cooling

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # **ECM DESCRIPTION**																				
8 Addition of Cooling					✔						✔				✔		✔			

Background

Variable Refrigerant Flow (VRF) unit

The addition of cooling to existing the classrooms served by horizontal unit ventilators can be accomplished by utilizing a Variable Refrigerant Flow (VRF) system. VRF systems are like traditional D/X split systems except that a single VRF heat pump condensing unit serves multiple D/X coils. The VRF condensing unit modulates the compressor and flow of refrigerant based on the exact heating and cooling demand of the connected indoor units. Some additional benefits of VRF systems versus traditional D/X split systems are: Reduced installation costs, reduced operational costs (less electrical consumption),ability to provide simultaneous heating and cooling with a single VRF system, less maintenance costs due to fewer mechanical components (i.e. compressors) ,and lower outdoor unit sound levels. The system being proposed in this ECM will utilize a standard classroom unit ventilator style indoor unit that will fit in the same area as the existing classroom unit ventilators. Heating will be accomplished utilizing the new VRF heat pumps with secondary electric resistance heating coils. Cooling will be accomplished utilizing direct expansion, or D/X, coils served by remote VRF condensing units. The unit ventilator will also allow for economizer mode of operation, or free cooling, when the outdoor ambient conditions are permit the use of 100% outside air.

Scope of Work

Unit Ventilator Cooling Scope of Work		
BUILDING	**PROPOSED**	**QUANTITY**
Thomas Jefferson Middle School	HW heat	
	Add cooling	62
	Electrical upgrades	
John Marshall Elementary School	HW heat	
	Add cooling	36
	Electrical upgrades	
Washington Elementary School	Steam heat	
	VRF heat	
	Electrical upgrades	
	Add cooling	36
FDR Round Building	VRF heat	
	Electrical upgrades	
	Add cooling	15

ECM Calculations

Energy Savings from the addition of cooling was calculated using BPU protocols.

UV Replacement - Cooling Savings								
BUILDING	**Proposed Qty**	**Tons Per Unit**	**Total Proposed Tons**	**EERq**	**CF**	**EFLH Cooling**	**Demand Savings (kW)**	**Energy Savings (kWh)**
Thomas Jefferson Middle School	62	3.0	186.0	14.0	0.67	466	-107	-74,294
	0		0.0		0.67	466	0	0
	0		0.0		0.67	466	0	0
John Marshall Elementary School	36	3.0	108.0	14.0	0.67	394	-62	-36,473
	0		0.0		0.67	394	0	0
	0		0.0		0.67	394	0	0
Washington Elementary School	26	3.0	78.0	14.0	0.67	394	-45	-26,342
	10	3.0	30.0	14.0	0.67	394	-17	-10,131
	0		0.0		0.67	394	0	0
FDR Round Building	15	3.0	45.0	14.0	0.67	394	-26	-15,197
	0		0.0		0.67	394	0	0
	0		0.0		0.67	394	0	0

Definition of Variables

N = Number of units

Tons = Rated cooling capacity of unit.This value comes from ARI/AHRI or AHAM rating or manufacturer data.

EER_b = Energy Efficiency Ratio of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER should be used in place of EER.

COP_b = Coefficient of Performance of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

EER_q = Energy Efficiency Ratio of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 (5.4 tons) BtuH, SEER should be used in place of EER.

COP_q = Coefficient of Performance of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 BtuH

(5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window. This value is based on existing measured usage and determined as the average number of operating hours during the peak window period.

$EFLH_{c\ or\ h}$ = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off-peak periods.

Summary of Inputs

HVAC and Heat Pumps

Component	Type	Value	Source
Tons	Variable	Rated Capacity, Tons	Application
EER_b	Variable	See Table below	1
EER_q	Variable	ARI/AHRI or AHAM Values	Application
CF	Fixed	50%	2
$EFLH_{(c\ or\ h)}$	Variable	See Tables below	3

HVAC Baseline Efficiencies Table – New Construction/EUL/RoF

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Unitary HVAC/Split Systems and Single Package, Air Cooled	
<=5.4 tons, split	14 SEER
<=5.4 tons, single	14 SEER
>5.4 to 11.25 tons	11.0 EER, 12.7 IEER
>11.25 to 20 tons	10.8 EER, 12.2 IEER
> 21 to 63 tons	9.8 EER, 11.4 IEER
>63 Tons	9.5 EER, 11.0 IEER
Air Cooled Heat Pump Systems, Split System and Single Package	
<=5.4 tons, split	14 SEER, 8.2 HSPF
<=5.4 tons, single	14 SEER, 8.0 HSPF
>5.4 to 11.25 tons	10.8 EER, 12 IEER, 3.3 heating COP
>11.25 to 20 tons	10.4 EER, 11.4 IEER, 3.2 heating COP
>= 21	9.3 EER, 10.4 IEER, 3.2 heating COP

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Water Source Heat Pumps (water to air, water loop) <=1.4 tons >1.4 to 5.4 tons >5.4 to 11.25 tons	 12.2 EER, 4.3 heating COP 13.0 EER, 4.3 heating COP 13.0 EER, 4.3 heating COP
Ground Water Source Heat Pumps <=11.25 tons	18.0 EER, 3.7 heating COP
Ground Source Heat Pumps (brine to air, ground loop) <=11.25 tons	14.1 EER, 3.2 heating COP
Package Terminal Air Conditioners[37]	14.0 – (0.300 * Cap/1,000), EER
Package Terminal Heat Pumps	14.0 – (0.300 * Cap/1,000), EER 3.7 – (0.052 * Cap/1,000), heating COP
Single Package Vertical Air Conditioners <=5.4 tons >5.4 to 11.25 tons >11.25 to 20 tons	 10.0 EER 10.0 EER 10.0 EER
Single Package Vertical Heat Pumps <=5.4 tons >5.4 to 11.25 tons >11.25 to 20 tons	 10.0 EER, 3.0 heating COP 10.0 EER, 3.0 heating COP 10.0 EER, 3.0 heating COP

Algorithms

Air Conditioning Algorithms:

Energy Savings (kWh/yr) = N * Tons * 12 kBtuh/Ton * ($1/EER_b$-$1/EER_q$) * $EFLH_c$

Peak Demand Savings (kW) = N * Tons * 12 kBtuh/Ton * ($1/EER_b$-$1/EER_q$) * CF

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955

Facility Type	Heating EFLH$_h$	Cooling EFLH$_c$
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

ECM 9 – Pipe and Valve Insulation

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
9 Pipe and Valve Insulation	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔				

Piping insulation is a critical part of energy management. It controls condensation, pipe freezing, and noise amongst other things. A percentage of heating (or cooling) can be lost through conduction if a pipe is not properly insulated.

Higher operational costs are a direct result of this for both heating and cooling systems. This ECM entails wrapping the existing bare metal pipe with an approved high-performance fiberglass insulation jacketing material.

Uninsulated hot water piping

Uninsulated pipe and valve insulation at Edison HS and Thomas Jefferson MS


Uninsulated pipe and valve insulation at John Adams MS and Woodrow Wilson MS


Uninsulated pipe and valve insulation at Lincoln ES and Washington ES

Scope of Work

Pipe and Valve Insulation Scope of Work							
Task	Benjamin Franklin Elementary School	Edison High School	Herbert Hoover Middle School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Adams Middle School
3-Way Valve Insulation (Units)							
Balance Valve Insulation (Units)						3	
Ball Valve Insulation (Units)		1					
Bonnet Inuslation (Units)	5	7				2	
Butterfly Valve Insulation (Units)	2		1	1			
Check Valve Insulation (Units)	2	1	2	1	2	1	2
Control Valve Insulation (Units)			1	1			1
End Cap Insulation (Units)		2	6	8	1		6
Flange Insulation (Units)	29	4	44	39	16	6	49
Flex Fitting Insulation (UT)	4		4	2		4	4
Flo-Check Insulation (Units)				2			
Gate Valve Insulation (Units)	9	2	11	13	4		14
Pipe Fitting Insulation (Units)	1	21	3	5			1
Pipe Reducer Insulation (Units)	2		2			2	2
Pump Insulation (Units)	1	2		1	2		
Steam Trap Insulation (Units)		1					
Straight Pipe Insulation (LF)		105		3	4		10
Strainer Insulation (Units)		1	1	1			
Suction Diffuser Insulation (Units)	2					2	2
Tank Insulation (Units)	1	1			1	1	
Triple Duty Valve Insulation (Units)						2	2

Pipe and Valve Insulation Scope of Work							
Task	John Marshall Elementary School	John P. Stevens High School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Thomas Jefferson Middle School	Washington Elementary School
3-Way Valve Insulation (Units)					1		
Balance Valve Insulation (Units)		1					
Ball Valve Insulation (Units)		4	1				
Bonnet Inuslation (Units)	6	3	5		4	3	6
Butterfly Valve Insulation (Units)	2				3		
Check Valve Insulation (Units)	2	1		4		2	
Control Valve Insulation (Units)		2		1		1	
End Cap Insulation (Units)	1		2				1
Flange Insulation (Units)	42	43	7	31	29	47	2
Flex Fitting Insulation (UT)	4	8		8	4	6	
Flo-Check Insulation (Units)							
Gate Valve Insulation (Units)	6	6	6	8	2	11	1
Pipe Fitting Insulation (Units)	14	6	45			2	28
Pipe Reducer Insulation (Units)	4	3			2		
Pump Insulation (Units)	4		2				2
Steam Trap Insulation (Units)			4				2
Straight Pipe Insulation (LF)	36	33	184	13	2		133
Strainer Insulation (Units)	2	2	5		2	1	1
Suction Diffuser Insulation (Units)	2	4		2	2	3	
Tank Insulation (Units)	2		4	1	1		2
Triple Duty Valve Insulation (Units)		4			4	3	

Pipe and Valve Insulation Scope of Work			
Task	Woodbrook Elementary School	Woodrow Wilson Middle School	Total Quantity
3-Way Valve Insulation (Units)	1		2
Balance Valve Insulation (Units)			4
Ball Valve Insulation (Units)	2		8
Bonnet Inuslation (Units)	4	9	54
Butterfly Valve Insulation (Units)	2		11
Check Valve Insulation (Units)	5		25
Control Valve Insulation (Units)		1	8
End Cap Insulation (Units)	1	1	29
Flange Insulation (Units)	35	32	455
Flex Fitting Insulation (UT)	8	4	60
Flo-Check Insulation (Units)			2
Gate Valve Insulation (Units)	4	4	101
Pipe Fitting Insulation (Units)	14		140
Pipe Reducer Insulation (Units)	4		21
Pump Insulation (Units)	2		16
Steam Trap Insulation (Units)			7
Straight Pipe Insulation (LF)	33		556
Strainer Insulation (Units)			16
Suction Diffuser Insulation (Units)	4	4	27
Tank Insulation (Units)	2	1	17
Triple Duty Valve Insulation (Units)		2	17

Insulation will be installed on exposed pipes and valves. Failed insulation will be replaced. Poorly insulated pipes in the heating and cooling distribution system is leading to unnecessary distribution losses and wasted energy. The scope of work will include

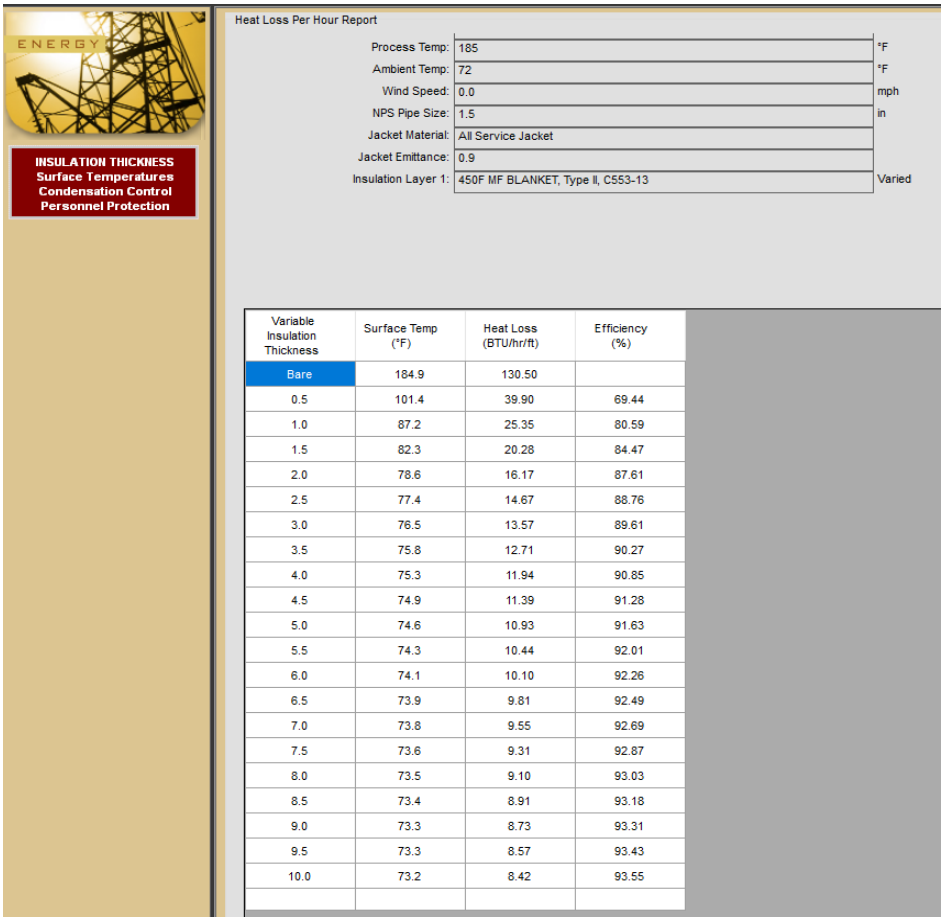
- Installation of pipe insulation to meet the insulation requirements of the fluid temperature in the pipe
- Utilize and install pipe wrap covering and jackets to protect the insulation material as required in the work area
- Materials will vary by the application and workspace
    - Fiberglass
    - Mineral wool
    - Foamglass
    - Styrofoam
    - Urethane
    - Closed cell rubber

ECM Calculations

Attached below is an example of the pipe and valve insulation calculations. Please see Saving Calculations Attached in Support Document section.

Cost	Total Reduction	Baseline	% Reduction
Edison High School	3239.994	157,133	2.06%
John P. Stevens High School	3320.319	125,094	2.65%
Herbert Hoover Middle School	3001.632	51,586	5.82%
John Adams Middle School	4287.425	62,099	6.90%
Thomas Jefferson Middle School	3222.034	40,311	7.99%
Woodrow Wilson Middle School	2010.850	30,566	6.58%
Benjamin Franklin Elementary School	2138.065	30,917	6.92%
James Madison Intermediate School	2572.495	21,389	12.03%
James Madison Primary School	892.427	26,236	3.40%
James Monroe Elementary School	641.731	19,862	3.23%
John Marshall Elementary School	3293.636	34,299	9.60%
Lincoln Elementary School	4396.580	70,587	6.23%
Lindeneau Elementary School	1631.639	22,897	7.13%
Martin Luther King Elementary School	1634.851	25,735	6.35%
Washington Elementary School	1973.270	35,256	5.60%
Woodbrook Elementary School	2953.304	39,191	7.54%

Shown below is a sample screenshot of 3ePlus software output for 1.5 in piping with various insulation thickness. The output reports are included in the support documents and were used to calculate energy savings.



Heat Loss Per Hour Report

Process Temp:	185	°F
Ambient Temp:	72	°F
Wind Speed:	0.0	mph
NPS Pipe Size:	1.5	in
Jacket Material:	All Service Jacket	
Jacket Emittance:	0.9	
Insulation Layer 1:	450F MF BLANKET, Type II, C553-13	Varied

Variable Insulation Thickness	Surface Temp (°F)	Heat Loss (BTU/hr/ft)	Efficiency (%)
Bare	184.9	130.50	
0.5	101.4	39.90	69.44
1.0	87.2	25.35	80.59
1.5	82.3	20.28	84.47
2.0	78.6	16.17	87.61
2.5	77.4	14.67	88.76
3.0	76.5	13.57	89.61
3.5	75.8	12.71	90.27
4.0	75.3	11.94	90.85
4.5	74.9	11.39	91.28
5.0	74.6	10.93	91.63
5.5	74.3	10.44	92.01
6.0	74.1	10.10	92.26
6.5	73.9	9.81	92.49
7.0	73.8	9.55	92.69
7.5	73.6	9.31	92.87
8.0	73.5	9.10	93.03
8.5	73.4	8.91	93.18
9.0	73.3	8.73	93.31
9.5	73.3	8.57	93.43
10.0	73.2	8.42	93.55

ECM 10 – Building Envelope Weatherization

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
10 Building Envelope Weatherization	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

An on-site survey of the existing air barrier continuity was conducted at Edison Twp BOE buildings. During the on-site inspection, several areas of the facilities were inspected for effective air barriers at the building envelope. Temperature, relative humidity, CO2 levels, smoke pencil testing and Infrared imaging was used to determine areas of uncontrolled air leakage into and out of the buildings.

Each of these facilities had varying degrees of uncontrolled air leakage into and out of the buildings. Typically, the exterior doors were found to have failed, missing or worn weather-seals and in some cases the exterior caulking had failed. Many of the facilities had insulation materials installed at the exterior roof/wall intersections. This can increase thermal values, however, the air leakage around the insulation and through the roof/wall joint was significant and results in increased energy costs.

Existing Conditions at John P Stevens HS, FDR Round Building, Washington ES, and Benjamin Franklin ES

Existing Conditions at James Monroe ES and Woodbrook ES

Scope of Work

Building Envelope Scope										
Task	John Adams Middle School	John Marshall Elementary School	John P. Stevens High School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Thomas Jefferson Middle School	Washington Elementary School	Woodbrook Elementary School	Woodrow Wilson Middle School
Buck Frame Air Sealing (LF)			72		16					502
Caulking (LF)							9			
Door - Install Jamb Spacer (Units)				3						
Door Weather Striping - Doubles (Units)	6	13	34	3	8	8	11	10	12	16
Door Weather Stripping - Singles (Units)	41	16	35	7	7	8	14	4	6	8
Overhang Air Sealing (LF)	12	20		17			23			
Overhang Air Sealing (SF)								2,223	9	
Overhead Door Weather Stripping (Units)	1			1				1	2	1
Roll-Up Door Weather Stripping (Units)			2		1	1				
Roof-Wall Intersection Air Sealing (LF)	317	180	1,819	806	329	1,001	678	452	207	1,262
Roof-Wall Intersection Air Sealing (SF)				747						
Wall Air Sealing (LF)				433						
Wall Air Sealing (SF)						598			2,478	

Building Envelope Scope										
Task	Benjamin Franklin Elementary School	Building and Grounds	Edison Early Learning Center	Edison Education Center	Edison High School	FDR Round Building	Herbert Hoover Middle School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School
Buck Frame Air Sealing (LF)	39						136			
Caulking (LF)										
Door - Install Jamb Spacer (Units)					15		10			
Door Weather Striping - Doubles (Units)	8		2	3	31	5	9	6	9	9
Door Weather Stripping - Singles (Units)	2	3		3	16	11	21	4	11	5
Overhang Air Sealing (LF)	423									
Overhang Air Sealing (SF)	1,109				135	741		1,245	1,212	
Overhead Door Weather Stripping (Units)	1				2		1			
Roll-Up Door Weather Stripping (Units)		4			4					
Roof-Wall Intersection Air Sealing (LF)	159		332	606	959	228		878	1,099	48
Roof-Wall Intersection Air Sealing (SF)	80									
Wall Air Sealing (LF)										
Wall Air Sealing (SF)										1,938

Building Envelope Scope	
Task	Total Quantity
Buck Frame Air Sealing (LF)	765
Caulking (LF)	9
Door - Install Jamb Spacer (Units)	28
Door Weather Striping - Doubles (Units)	203
Door Weather Stripping - Singles (Units)	222
Overhang Air Sealing (LF)	495
Overhang Air Sealing (SF)	6,674
Overhead Door Weather Stripping (Units)	10
Roll-Up Door Weather Stripping (Units)	12
Roof-Wall Intersection Air Sealing (LF)	11,360
Roof-Wall Intersection Air Sealing (SF)	827
Wall Air Sealing (LF)	433
Wall Air Sealing (SF)	5,013

- Attic Air Barrier Retrofit
- Attic Bypass Sealing
    - Weather strip and insulate the attic hatch to provide an air tight seal with permanently fixed insulation to prevent thermal heat gain and loss consistent with the surrounding attic recommendations.
- Attic Flat Insulation
    - Install 12 inches of cellulose across the attic flat
- Door Weather Stripping
- Overhead Door Weather Stripping/Roll-up Door Weather Stripping
    - Install heavy-duty aluminum carrier with oversized vinyl insert gasket at the sides and top.
- Roof Air Barrier Retrofit
    - Install Thermax and appropriate sheathing tapes and/or air sealing foam to ensure an air tight seal.
    - Install Hatch – weather strip and insulate consistent with the Roof Air Barrier Retrofit to ensure a removable but air tight roof hatch assembly.
- Roof Insulation
- Roof Wall Intersection Air Sealing

ECM Calculations

Please see Saving Calculation in Supporting Documents for methodology and calculations used.

BUILDING	INFILTRATION REDUCTION (CFM)	HEATING EFFICIENCY (%)	Cooling Eff (kW/ton)	COP	therms savings	kWh savings	Baseline therms	Baseline kWh
Edison High School	2,408	76.0%	1.30	2.70	2,194	5,954	2,348	6,371
John P. Stevens High School	4,123	87.0%	1.27	2.78	3,282	9,895	3,512	10,587
Herbert Hoover Middle School	782	81.6%	1.32	2.67	664	1,951	710	2,087
John Adams Middle School	1,539	76.2%	1.14	3.08	1,399	3,336	1,497	3,570
Thomas Jefferson Middle School	1,369	76.2%	1.30	2.71	1,244	3,366	1,331	3,602
Woodrow Wilson Middle School	2,351	79.6%	1.37	2.56	2,046	6,120	2,189	6,549
Benjamin Franklin Elementary School	2,759	79.3%	1.30	2.70	2,408	6,804	2,577	7,280
James Madison Intermediate School	1,943	78.6%	1.26	2.79	1,712	4,645	1,832	4,970
James Madison Primary School	2,437	86.1%	1.30	2.71	1,959	5,995	2,096	6,415
James Monroe Elementary School	2,243	85.7%	1.14	3.08	1,812	4,861	1,939	5,202
John Marshall Elementary School	953	75.1%	1.18	2.99	878	2,127	940	2,276
Lincoln Elementary School	2,610	75.2%	1.26	2.80	2,405	6,222	2,573	6,657
Lindeneau Elementary School	815	84.5%	1.30	2.71	668	2,009	714	2,150
Martin Luther King Elementary School	1,853	79.3%	1.26	2.80	1,619	4,420	1,732	4,729
Washington Elementary School	2,624	83.5%	1.25	2.82	2,176	6,199	2,329	6,633
Woodbrook Elementary School	3,446	80.7%	1.22	2.89	2,957	7,947	3,164	8,504
FDR Round Building	1,443	100.0%	1.23	2.87	-	32,646	-	34,931
Edison Early Learning Center	301	77.1%	1.26	2.79	270	720	289	770
Edison Education Center	609	80.0%	1.20	2.94	527	1,380	564	1,477
Building and Grounds	195	80.0%	1.20	2.93	169	444	181	475

BUILDING	current therms	current kWh	% therm savings	%kWh savings	Cost
Edison High School	157,133	1,416,007	1%	0%	$ 45,024.00
John P. Stevens High School	125,094	1,811,135	3%	1%	$ 73,046.00
Herbert Hoover Middle School	51,586	570,225	1%	0%	$ 13,820.00
John Adams Middle School	62,099	437,710	2%	1%	$ 22,839.00
Thomas Jefferson Middle School	40,311	382,680	3%	1%	$ 22,097.00
Woodrow Wilson Middle School	30,566	584,046	7%	1%	$ 39,621.00
Benjamin Franklin Elementary School	30,917	264,540	8%	3%	$ 42,895.00
James Madison Intermediate School	21,389	519,612	8%	1%	$ 49,483.00
James Madison Primary School	26,236	293,940	7%	2%	$ 56,910.00
James Monroe Elementary School	19,862	476,430	9%	1%	$ 50,790.00
John Marshall Elementary School	34,299	459,642	3%	0%	$ 14,668.00
Lincoln Elementary School	70,587	250,720	3%	2%	$ 46,542.00
Lindeneau Elementary School	22,897	205,080	3%	1%	$ 14,084.00
Martin Luther King Elementary School	25,735	281,880	6%	2%	$ 36,318.00
Washington Elementary School	35,256	359,600	6%	2%	$ 67,632.00
Woodbrook Elementary School	39,191	553,151	8%	1%	$ 65,035.00
FDR Round Building	-	210,080	0%	16%	$ 27,039.00
Edison Early Learning Center	6,257	57,330	4%	1%	$ 5,375.00
Edison Education Center	7,081	319,600	7%	0%	$ 10,130.00
Building and Grounds	10,354	50,419	2%	1%	$ 3,662.00

ECM 11 – Water Conservation

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
11	Water Conservation	✔	✔	✔	✔		✔		✔	✔	✔		✔		✔	✔	✔	✔		✔	✔

It takes a considerable amount of energy to deliver and treat the water you use every day. For example, letting your faucet run for five minutes uses about as much energy as letting a 60-watt light bulb run for 22 hours. Pump and water heating energy is required to deliver hot water to the end user. Installing new fixtures and aerators can conserve substantial energy while reducing water consumption as well.

New low flow fixtures are rated at 0.5 gallons per minute and can be fitted with time based automatic shut-offs.

Fixture with aerator

Scope of Work

Existing faucets within the facilities will retrofit with high efficiency aerators. Select toilets will have flush valves replaced while other will be replaced completely.

Facility / Building Name	Faucet			Shower		Urinal		Toilet			
	Existing Fixture Count	Do Not Retrofit	Install / Replace Faucet Aerator	Existing Fixture Count	Do Not Retrofit	Existing Fixture Count	Do Not Retrofit	Existing Fixture Count	Do Not Retrofit	Replace Toilet Valve Only	Replace Toilet China and Valve
Edison HS	136	17	119	0	0	0	0	0	0	0	0
Washington es	39	0	39	0	0	0	0	0	0	0	0
Lincoln es	49	0	49	0	0	13	13	37	11	7	19
Stevens HS	107	6	101	0	0	31	31	88	60	0	28
Edison Education Center	24	0	24	0	0	0	0	0	0	0	0
Herbert Hoover MS	68	0	68	0	0	0	0	0	0	0	0
Building and Grounds	3	0	3	0	0	0	0	0	0	0	0
James Monroe ES	53	0	53	0	0	0	0	0	0	0	0
Woodrow Wilson MS	52	0	52	0	0	0	0	0	0	0	0
Woodbrook ES	68	0	68	0	0	0	0	0	0	0	0
John Adams MS	48	0	48	0	0	0	0	0	0	0	0
James Madison IS	35	0	35	0	0	0	0	0	0	0	0
FDR Round Bldg	12	0	12	0	0	0	0	0	0	0	0
James Madison PS	37	0	37	0	0	0	0	0	0	0	0
MLK ES	43	0	43	0	0	0	0	0	0	0	0
Totals	774	23	751	0	0	44	44	125	71	7	47

ECM Calculations

Fuel savings associated with water conservation from faucet aerators is calculated using NJ BPU Protocols. Please note that baseline water consumption was calibrated against existing utility baseline data to insure saving projections were achievable. Therefore, BPU water use duration variables were reduced to be in line with baseline water consumption.

Water Conservation Fuel Savings

BUILDING NAME		Public Restroom Faucets									
	DHW Type	Number of Fixtures	Existing (GPM)	Proposed (GPM)	Duration (Min)	Days per year	dT (F)	EFF	Baseline Consupmtion (Therms)	Electric Savings (kWh)	Fuel Savings (Therms)
Edison High School	Natural Gas	108	2.2	0.5	5	180	27.40	80%	610.09	0	471
John P. Stevens High School	Natural Gas	43	2.2	0.5	10	180	27.40	80%	485.81	0	375
Herbert Hoover Middle School	Natural Gas	61	2.2	0.5	10	180	27.40	80%	689.18	0	533
John Adams Middle School	Natural Gas	43	2.2	0.5	10	180	27.40	80%	485.81	0	375
Thomas Jefferson Middle School	Natural Gas	0	2.2	0.5	10	180	27.40	80%	0.00	0	0
Woodrow Wilson Middle School	Natural Gas	47	2.2	0.5	10	180	27.40	80%	531.01	0	410
Benjamin Franklin Elementary School	Natural Gas	0	2.2	0.5	10	180	27.40	80%	0.00	0	0
James Madison Intermediate School	Natural Gas	24	2.2	0.5	10	180	27.40	80%	271.15	0	210
James Madison Primary School	Natural Gas	25	2.2	0.5	10	180	27.40	80%	282.45	0	218
James Monroe Elementary School	Natural Gas	36	2.2	0.5	5	180	27.40	80%	203.36	0	157
John Marshall Elementary School	Natural Gas	0	2.2	0.5	10	180	27.40	80%	0.00	0	0
Lincoln Elementary School	Natural Gas	27	2.2	0.5	10	180	27.40	80%	305.05	0	236
Lindeneau Elementary School	Natural Gas	0	2.2	0.5	10	180	27.40	80%	0.00	0	0
Martin Luther King Elementary School	Natural Gas	29	2.2	0.5	10	180	27.40	80%	327.64	0	253
Washington Elementary School	Natural Gas	33	2.2	0.5	10	180	27.40	80%	372.83	0	288
Woodbrook Elementary School	Natural Gas	46	2.2	0.5	10	180	27.40	80%	519.71	0	402
FDR Round Building	Electric	8	2.2	0.5	10	180	27.40	100%		1637	
Edison Early Learning Center	Natural Gas	0	2.2	0.5	10	180	27.40	80%	0.00	0	0
Edison Education Center	Natural Gas	16	2.2	0.5	5	250	27.40	80%	125.53	0	97
Building and Grounds	Natural Gas	2	2.2	0.5	5	250	27.40	80%	15.69	0	12

Water Conservation Fuel Savings

BUILDING NAME	Kitchen/Lounge/Nurse Faucets										Total Savings		
	Number of Fixtures	Existing (GPM)	Proposed (GPM)	Duration (Min)	Days per year	dT (F)	% HW	Baseline Consupmtion (Therms)	Electric Savings (kWh)	Fuel Savings (Therms)	Total Aerators	Total Electrtic Savings (kWh)	Total Fuel Savings (Therms)
Edison High School	11	2.2	1.5	5.00	180.00	27.40	80%	62.14	0	20	119	0	491
John P. Stevens High School	5	2.2	1.5	10.00	180.00	27.40	80%	56.49	0	18	48	0	393
Herbert Hoover Middle School	7	2.2	1.5	10.00	180.00	27.40	80%	79.09	0	25	68	0	558
John Adams Middle School	5	2.2	1.5	10.00	180.00	27.40	80%	56.49	0	18	48	0	393
Thomas Jefferson Middle School	0	2.2	1.5	10.00	180.00	27.40	80%	0.00	0	0	0	0	0
Woodrow Wilson Middle School	5	2.2	1.5	10.00	180.00	27.40	80%	56.49	0	18	52	0	428
Benjamin Franklin Elementary School	0	2.2	1.5	10.00	180.00	27.40	80%	0.00	0	0	0	0	0
James Madison Intermediate School	11	2.2	1.5	10.00	180.00	27.40	80%	124.28	0	40	35	0	249
James Madison Primary School	12	2.2	1.5	10.00	180.00	27.40	80%	135.58	0	43	37	0	261
James Monroe Elementary School	17	2.2	1.5	5.00	180.00	27.40	80%	96.03	0	31	53	0	188
John Marshall Elementary School	0	2.2	1.5	10.00	180.00	27.40	80%	0.00	0	0	0	0	0
Lincoln Elementary School	22	2.2	1.5	10.00	180.00	27.40	80%	248.56	0	79	49	0	315
Lindeneau Elementary School	0	2.2	1.5	10.00	180.00	27.40	80%	0.00	0	0	0	0	0
Martin Luther King Elementary School	14	2.2	1.5	10.00	180.00	27.40	80%	158.17	0	50	43	0	304
Washington Elementary School	6	2.2	1.5	10.00	180.00	27.40	80%	67.79	0	22	39	0	310
Woodbrook Elementary School	22	2.2	1.5	10.00	180.00	27.40	80%	248.56	0	79	68	0	481
FDR Round Building	4	2.2	1.5	10.00	180.00	27.40	100%		337		12	1,974	0
Edison Early Learning Center	0	2.2	1.5	10.00	180.00	27.40	80%	0.00	0	0	0	0	0
Edison Education Center	8	2.2	1.5	5.00	250.00	27.40	80%	62.77	0	20	24	0	117
Building and Grounds	1	2.2	1.5	5.00	250.00	27.40	80%	7.85	0	2	3	0	15

Water Conservation Savings

BUILDING NAME	Water Usage (Gal/Yr) Existing	Baseline Facuet Flow (Gallons Per Year)	Proposed Facuet Flow (Gallons Per Year)	Water Savings (gal)
Edison High School	523,600	235,620	63,450	172,170
John P. Stevens High School	3,300,176	190,080	52,200	137,880
Herbert Hoover Middle School	897,600	269,280	73,800	195,480
John Adams Middle School	538,560	190,080	52,200	137,880
Thomas Jefferson Middle School	743,512	0	0	0
Woodrow Wilson Middle School	1,374,096	205,920	55,800	150,120
Benjamin Franklin Elementary School	506,396	0	0	0
James Madison Intermediate School	1,215,000	138,600	51,300	87,300
James Madison Primary School	0	146,520	54,900	91,620
James Monroe Elementary School	301,444	104,940	39,150	65,790
John Marshall Elementary School	483,492	0	0	0
Lincoln Elementary School	840,752	194,040	83,700	110,340
Lindeneau Elementary School	261,052	0	0	0
Martin Luther King Elementary School	336,600	170,280	63,900	106,380
Washington Elementary School	807,092	154,440	45,900	108,540
Woodbrook Elementary School	713,592	269,280	100,800	168,480
FDR Round Building	0	47,520	18,000	29,520
Edison Early Learning Center	50,116	0	0	0
Edison Education Center	216,172	66,000	25,000	41,000
Building and Grounds	17,204	8,250	3,125	5,125

2021 NJ BPU Protocols:

Low Flow Faucet Aerators and Showerheads

Algorithm

Therm or kWh Fuel Savings/yr = N * M * D * (F_b – F_q) * (8.33 * DT / EFF)/ C

Definition of Variables

N = Number of fixtures

M = Minutes per day of device usage

D = Days per year of device usage

F_b = Baseline device flow rate (gal/m)

F_q = Low flow device flow rate (gal/m)

8.33 = Heat content of water (Btu/gal/°F)

DT = Difference in temperature (°F) between cold intake and output

EFF = Efficiency of water heating equipment

C = Conversion factor from Btu to therms or kWh = (100,000 for gas water heating (Therms), 3,413 for electric water heating (kWh)

Summary of Inputs

Low Flow Faucet Aerators and Showerheads

Component	Type	Value	Source
N	Variable		Application
M	Fixed	Aerators 30 minutes	1
		Shower heads 20 minutes	
D	Fixed	Aerators 260 days	1
		Shower heads 365 days	
F_b	Fixed	Aerators 2.2 gpm	
		Showerhead 2.5 gpm	
F_q	Fixed	Aerators <=1.5 gpm (kitchen) <=0.5 gpm (public restroom) <=1.5 gpm (private restroom)	2,3,4
		Showerheads <=2 gpm	4
DT	Fixed	Aerators 27.4°F	5
		Showerheads 44.4°F	6
EFF	Fixed	98% electric 80% natural gas	7,8

ECM 12 – Plug Load Controls

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
12 Plug Load Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Plug loads are often used for a small portion of the day. Left unmanaged, these loads can add a significant usage and cost to a buildings electric load. Plug load controls utilize specialty sockets from BERT that have software to track real-time usage of your appliances. The software also allows the user to use a web browser to view this usage and automatically turn on/off all appliances plugged into these outlets.

Scope of Work

Existing wall plugs within the facilities will be retrofit with specialty controllable wall plugs.

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Edison High School	250,499	Bert 110X	Network Verification Units	2
		Bert 110X		80
		Extended Maintenance	3 years extended software maintenance	80
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	4
		Extended Maint.	3 years extended software maintenance	4
		Bert 240I Inline		11
		Extended Maint.	3 years extended software maintenance	11
		Installation	Inline units must be installed by a licensed electrician	11
		Bert Harness	Bert Harness	1
		Installation	Install Bert Harness - assumes no prevailing wage	1
		Device Sticker		80
		Instructions		91
		Set up	Preload SSID and Passphrase - plug in	80
		Set up	Preload SSID and Passphrase - inline	11
		Program	Name, Group and Schedule Berts	91
		Test	Verify Network Communication and Final Test	91
		Training	Remote Software Training/Customer Signoff	1
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	80
		Travel	Travel expenses	1
		Shipping charges	FedEx Ground	1
John P. Stevens High School	220,287	Bert 110X	Network Verification Units	
		Bert 110X		72
		Extended Maintenance	3 years extended software maintenance	72
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	2
		Extended Maint.	3 years extended software maintenance	2
		Bert 240I Inline		6
		Extended Maint.	3 years extended software maintenance	6
		Installation	Inline units must be installed by a licensed electrician	6
		Bert Harness	Bert Harness	3
		Installation	Install Bert Harness - assumes no prevailing wage	3
		Device Sticker		72
		Instructions		78
		Set up	Preload SSID and Passphrase - plug in	72
		Set up	Preload SSID and Passphrase - inline	6
		Program	Name, Group and Schedule Berts	78
		Test	Verify Network Communication and Final Test	78
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	72
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Herbert Hoover Middle School	132,625	Bert 110X	Network Verification Units	
		Bert 110X		50
		Extended Maintenance	3 years extended software maintenance	50
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	29
		Extended Maint.	3 years extended software maintenance	29
		Bert 240I Inline		10
		Extended Maint.	3 years extended software maintenance	10
		Installation	Inline units must be installed by a licensed electrician	10
		Bert Harness	Bert Harness	12
		Installation	Install Bert Harness - assumes no prevailing wage	12
		Device Sticker		50
		Instructions		60
		Set up	Preload SSID and Passphrase - plug in	50
		Set up	Preload SSID and Passphrase - inline	10
		Program	Name, Group and Schedule Berts	60
		Test	Verify Network Communication and Final Test	60
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	50
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
John Adams Middle School	93,041	Bert 110X	Network Verification Units	
		Bert 110X		54
		Extended Maintenance	3 years extended software maintenance	54
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	37
		Extended Maint.	3 years extended software maintenance	37
		Bert 240I Inline		8
		Extended Maint.	3 years extended software maintenance	8
		Installation	Inline units must be installed by a licensed electrician	8
		Bert Harness	Bert Harness	4
		Installation	Install Bert Harness - assumes no prevailing wage	4
		Device Sticker		54
		Instructions		62
		Set up	Preload SSID and Passphrase - plug in	54
		Set up	Preload SSID and Passphrase - inline	8
		Program	Name, Group and Schedule Berts	62
		Test	Verify Network Communication and Final Test	62
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	54
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Thomas Jefferson Middle School	90,514	Bert 110X	Network Verification Units	
		Bert 110X		81
		Extended Maintenance	3 years extended software maintenance	81
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	9
		Extended Maint.	3 years extended software maintenance	9
		Bert 240I Inline		5
		Extended Maint.	3 years extended software maintenance	5
		Installation	Inline units must be installed by a licensed electrician	5
		Bert Harness	Bert Harness	24
		Installation	Install Bert Harness - assumes no prevailing wage	24
		Device Sticker		81
		Instructions		86
		Set up	Preload SSID and Passphrase - plug in	81
		Set up	Preload SSID and Passphrase - inline	5
		Program	Name, Group and Schedule Berts	86
		Test	Verify Network Communication and Final Test	86
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	81
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Woodrow Wilson Middle School	102,122	Bert 110X	Network Verification Units	
		Bert 110X		71
		Extended Maintenance	3 years extended software maintenance	71
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	50
		Extended Maint.	3 years extended software maintenance	50
		Bert 240I Inline		13
		Extended Maint.	3 years extended software maintenance	13
		Installation	Inline units must be installed by a licensed electrician	13
		Bert Harness	Bert Harness	4
		Installation	Install Bert Harness - assumes no prevailing wage	4
		Device Sticker		71
		Instructions		84
		Set up	Preload SSID and Passphrase - plug in	71
		Set up	Preload SSID and Passphrase - inline	13
		Program	Name, Group and Schedule Berts	84
		Test	Verify Network Communication and Final Test	84
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	71
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
James Monroe Elementary School	67,800	Bert 110X	Network Verification Units	
		Bert 110X		49
		Extended Maintenance	3 years extended software maintenance	49
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	25
		Extended Maint.	3 years extended software maintenance	25
		Bert 240I Inline		0
		Extended Maint.	3 years extended software maintenance	0
		Installation	Inline units must be installed by a licensed electrician	0
		Bert Harness	Bert Harness	18
		Installation	Install Bert Harness - assumes no prevailing wage	18
		Device Sticker		49
		Instructions		49
		Set up	Preload SSID and Passphrase - plug in	49
		Set up	Preload SSID and Passphrase - inline	0
		Program	Name, Group and Schedule Berts	49
		Test	Verify Network Communication and Final Test	49
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	49
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
John Marshall Elementary School	62,517	Bert 110X	Network Verification Units	
		Bert 110X		54
		Extended Maintenance	3 years extended software maintenance	54
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	22
		Extended Maint.	3 years extended software maintenance	22
		Bert 240I Inline		10
		Extended Maint.	3 years extended software maintenance	10
		Installation	Inline units must be installed by a licensed electrician	10
		Bert Harness	Bert Harness	24
		Installation	Install Bert Harness - assumes no prevailing wage	24
		Device Sticker		54
		Instructions		64
		Set up	Preload SSID and Passphrase - plug in	54
		Set up	Preload SSID and Passphrase - inline	10
		Program	Name, Group and Schedule Berts	64
		Test	Verify Network Communication and Final Test	64
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	54
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Lincoln Elementary School	55,315	Bert 110X	Network Verification Units	
		Bert 110X		49
		Extended Maintenance	3 years extended software maintenance	49
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	23
		Extended Maint.	3 years extended software maintenance	23
		Bert 240I Inline		11
		Extended Maint.	3 years extended software maintenance	11
		Installation	Inline units must be installed by a licensed electrician	11
		Bert Harness	Bert Harness	10
		Installation	Install Bert Harness - assumes no prevailing wage	10
		Device Sticker		49
		Instructions		60
		Set up	Preload SSID and Passphrase - plug in	49
		Set up	Preload SSID and Passphrase - inline	11
		Program	Name, Group and Schedule Berts	60
		Test	Verify Network Communication and Final Test	60
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	49
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Benjamin Franklin Elementary School	56,975	Bert 110X	Network Verification Units	
		Bert 110X		51
		Extended Maintenance	3 years extended software maintenance	51
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	20
		Extended Maint.	3 years extended software maintenance	20
		Bert 240I Inline		21
		Extended Maint.	3 years extended software maintenance	21
		Installation	Inline units must be installed by a licensed electrician	21
		Bert Harness	Bert Harness	22
		Installation	Install Bert Harness - assumes no prevailing wage	22
		Device Sticker		51
		Instructions		72
		Set up	Preload SSID and Passphrase - plug in	51
		Set up	Preload SSID and Passphrase - inline	21
		Program	Name, Group and Schedule Berts	72
		Test	Verify Network Communication and Final Test	72
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	51
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
James Madison Intermediate School	44,000	Bert 110X	Network Verification Units	
		Bert 110X		37
		Extended Maintenance	3 years extended software maintenance	37
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	18
		Extended Maint.	3 years extended software maintenance	18
		Bert 240I Inline		5
		Extended Maint.	3 years extended software maintenance	5
		Installation	Inline units must be installed by a licensed electrician	5
		Bert Harness	Bert Harness	13
		Installation	Install Bert Harness - assumes no prevailing wage	13
		Device Sticker		37
		Instructions		42
		Set up	Preload SSID and Passphrase - plug in	37
		Set up	Preload SSID and Passphrase - inline	5
		Program	Name, Group and Schedule Berts	42
		Test	Verify Network Communication and Final Test	42
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	37
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
James Madison Primary School	46,000	Bert 110X	Network Verification Units	
		Bert 110X		48
		Extended Maintenance	3 years extended software maintenance	48
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	20
		Extended Maint.	3 years extended software maintenance	20
		Bert 240I Inline		1
		Extended Maint.	3 years extended software maintenance	1
		Installation	Inline units must be installed by a licensed electrician	1
		Bert Harness	Bert Harness	18
		Installation	Install Bert Harness - assumes no prevailing wage	18
		Device Sticker		48
		Instructions		49
		Set up	Preload SSID and Passphrase - plug in	48
		Set up	Preload SSID and Passphrase - inline	1
		Program	Name, Group and Schedule Berts	49
		Test	Verify Network Communication and Final Test	49
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	48
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Lindeneau Elementary School	45,503	Bert 110X	Network Verification Units	
		Bert 110X		50
		Extended Maintenance	3 years extended software maintenance	50
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	0
		Extended Maint.	3 years extended software maintenance	0
		Bert 240I Inline		3
		Extended Maint.	3 years extended software maintenance	3
		Installation	Inline units must be installed by a licensed electrician	3
		Bert Harness	Bert Harness	11
		Installation	Install Bert Harness - assumes no prevailing wage	11
		Device Sticker		50
		Instructions		53
		Set up	Preload SSID and Passphrase - plug in	50
		Set up	Preload SSID and Passphrase - inline	3
		Program	Name, Group and Schedule Berts	53
		Test	Verify Network Communication and Final Test	53
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	50
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Martin Luther King Elementary School	54,136	Bert 110X	Network Verification Units	
		Bert 110X		35
		Extended Maintenance	3 years extended software maintenance	35
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	22
		Extended Maint.	3 years extended software maintenance	22
		Bert 240I Inline		7
		Extended Maint.	3 years extended software maintenance	7
		Installation	Inline units must be installed by a licensed electrician	7
		Bert Harness	Bert Harness	12
		Installation	Install Bert Harness - assumes no prevailing wage	12
		Device Sticker		35
		Instructions		42
		Set up	Preload SSID and Passphrase - plug in	35
		Set up	Preload SSID and Passphrase - inline	7
		Program	Name, Group and Schedule Berts	42
		Test	Verify Network Communication and Final Test	42
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	35
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Washington Elementary School	56,410	Bert 110X	Network Verification Units	
		Bert 110X		49
		Extended Maintenance	3 years extended software maintenance	49
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	23
		Extended Maint.	3 years extended software maintenance	23
		Bert 240I Inline		6
		Extended Maint.	3 years extended software maintenance	6
		Installation	Inline units must be installed by a licensed electrician	6
		Bert Harness	Bert Harness	21
		Installation	Install Bert Harness - assumes no prevailing wage	21
		Device Sticker		49
		Instructions		55
		Set up	Preload SSID and Passphrase - plug in	49
		Set up	Preload SSID and Passphrase - inline	6
		Program	Name, Group and Schedule Berts	55
		Test	Verify Network Communication and Final Test	55
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	49
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Woodbrook Elementary School	85,954	Bert 110X	Network Verification Units	
		Bert 110X		83
		Extended Maintenance	3 years extended software maintenance	83
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	42
		Extended Maint.	3 years extended software maintenance	42
		Bert 240I Inline		18
		Extended Maint.	3 years extended software maintenance	18
		Installation	Inline units must be installed by a licensed electrician	18
		Bert Harness	Bert Harness	34
		Installation	Install Bert Harness - assumes no prevailing wage	34
		Device Sticker		83
		Instructions		101
		Set up	Preload SSID and Passphrase - plug in	83
		Set up	Preload SSID and Passphrase - inline	18
		Program	Name, Group and Schedule Berts	101
		Test	Verify Network Communication and Final Test	101
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	83
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
FDR Round Building	14,750	Bert 110X	Network Verification Units	
		Bert 110X		21
		Extended Maintenance	3 years extended software maintenance	21
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	11
		Extended Maint.	3 years extended software maintenance	11
		Bert 240I Inline		0
		Extended Maint.	3 years extended software maintenance	0
		Installation	Inline units must be installed by a licensed electrician	0
		Bert Harness	Bert Harness	0
		Installation	Install Bert Harness - assumes no prevailing wage	0
		Device Sticker		21
		Instructions		21
		Set up	Preload SSID and Passphrase - plug in	21
		Set up	Preload SSID and Passphrase - inline	0
		Program	Name, Group and Schedule Berts	21
		Test	Verify Network Communication and Final Test	21
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	21
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Edison Early Learning Center	7,297	Bert 110X	Network Verification Units	
		Bert 110X		5
		Extended Maintenance	3 years extended software maintenance	5
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	3
		Extended Maint.	3 years extended software maintenance	3
		Bert 240I Inline		0
		Extended Maint.	3 years extended software maintenance	0
		Installation	Inline units must be installed by a licensed electrician	0
		Bert Harness	Bert Harness	0
		Installation	Install Bert Harness - assumes no prevailing wage	0
		Device Sticker		5
		Instructions		5
		Set up	Preload SSID and Passphrase - plug in	5
		Set up	Preload SSID and Passphrase - inline	0
		Program	Name, Group and Schedule Berts	5
		Test	Verify Network Communication and Final Test	5
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	5
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

Plug Load Controller Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Edison Education Center	30,000	Bert 110X	Network Verification Units	
		Bert 110X		23
		Extended Maintenance	3 years extended software maintenance	23
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	0
		Extended Maint.	3 years extended software maintenance	0
		Bert 240I Inline		0
		Extended Maint.	3 years extended software maintenance	0
		Installation	Inline units must be installed by a licensed electrician	0
		Bert Harness	Bert Harness	0
		Installation	Install Bert Harness - assumes no prevailing wage	0
		Device Sticker		23
		Instructions		23
		Set up	Preload SSID and Passphrase - plug in	23
		Set up	Preload SSID and Passphrase - inline	0
		Program	Name, Group and Schedule Berts	23
		Test	Verify Network Communication and Final Test	23
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	23
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	
Building and Grounds	12,000	Bert 110X	Network Verification Units	
		Bert 110X		1
		Extended Maintenance	3 years extended software maintenance	1
		Bert Threshold Vend Software	Threshold/Vend Software License Fee	0
		Extended Maint.	3 years extended software maintenance	0
		Bert 240I Inline		0
		Extended Maint.	3 years extended software maintenance	0
		Installation	Inline units must be installed by a licensed electrician	0
		Bert Harness	Bert Harness	0
		Installation	Install Bert Harness - assumes no prevailing wage	0
		Device Sticker		1
		Instructions		1
		Set up	Preload SSID and Passphrase - plug in	1
		Set up	Preload SSID and Passphrase - inline	0
		Program	Name, Group and Schedule Berts	1
		Test	Verify Network Communication and Final Test	1
		Training	Remote Software Training/Customer Signoff	
		Installation	Install Berts and record MAC Address - plug in units only. Assumes no prevailing wage	1
		Travel	Travel expenses	
		Shipping charges	FedEx Ground	

ECM Calculations

Energy savings are calculated by multiplying the equipment Standby Power Draw (W) by the number of hours the plug load will shut the equipment off completely:

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Plug Load Controller Savings

BUILDING NAME	Device Type	Plug Load Type	Quantity	Standby Power Draw (W)	Hours per Year	Baseline Hours Scheduled ON per Year	Baseline Equipment on STANDBY Hours	Baseline No Power Draw (Unit Unplugged from outlet)	Proposed Equipment ON Hours per Year	Proposed Equipment on Standby Hours per	Proposed Equipment No Power Draw (BERT Controller cuts off power) Hours per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
James Madison Primary School	Projector	Bert 110X	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
James Madison Primary School	Smartboard TV	Bert 110X	20	8	8,760	2,035	6,725	0	2,035	0	6,725	1,076	
James Madison Primary School	Charging Cart	Bert 110X	18	37	8,760	2,035	6,725	0	2,035	0	6,725	4,479	8,245
James Madison Primary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	
James Madison Primary School	AC - 110V (15A)	Bert 110X	8	8	8,760	2,035	6,725	0	2,035	0	6,725	430	
James Madison Primary School	AC - 220V (< 20A)	Bert 240I Inline	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
James Monroe Elementary School	Projector	Bert 110X	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
James Monroe Elementary School	Smartboard TV	Bert 110X	25	8	8,760	2,035	6,725	0	2,035	0	6,725	1,345	
James Monroe Elementary School	Charging Cart	Bert 110X	18	37	8,760	2,035	6,725	0	2,035	0	6,725	4,479	8,433
James Monroe Elementary School	Printer	Bert 110X	4	15	8,760	2,035	6,725	0	2,035	0	6,725	404	
James Monroe Elementary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	
John Marshall Elementary School	Smartboard TV	Bert 110X	22	8	8,760	2,035	6,725	0	2,035	0	6,725	1,184	
John Marshall Elementary School	Copier - 110 15A	Bert 110X	1	13	8,760	2,035	6,725	0	2,035	0	6,725	87	
John Marshall Elementary School	Charging Cart	Bert 110X	24	37	8,760	2,035	6,725	0	2,035	0	6,725	5,972	8,252
John Marshall Elementary School	Printer	Bert 110X	2	15	8,760	2,035	6,725	0	2,035	0	6,725	202	
John Marshall Elementary School	AC - 110V (15A)	Bert 110X	5	8	8,760	2,035	6,725	0	2,035	0	6,725	269	
John Marshall Elementary School	AC - 220V (< 20A)	Bert 240I Inline	10	8	8,760	2,035	6,725	0	2,035	0	6,725	538	
Lincoln Elementary School	Smartboard TV	Bert 110X	23	8	8,760	2,035	6,725	0	2,035	0	6,725	1,237	
Lincoln Elementary School	Charging Cart	Bert 110X	10	37	8,760	2,035	6,725	0	2,035	0	6,725	2,488	
Lincoln Elementary School	Printer	Bert 110X	4	15	8,760	2,035	6,725	0	2,035	0	6,725	404	
Lincoln Elementary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	7,465
Lincoln Elementary School	AC - 110V (15A)	Bert 110X	11	8	8,760	2,035	6,725	0	2,035	0	6,725	592	
Lincoln Elementary School	AC - 220V (< 20A)	Bert 240I Inline	11	8	8,760	2,035	6,725	0	2,035	0	6,725	592	
Lindeneau Elementary School	Projector	Bert 110X	24	8	8,760	2,035	6,725	0	2,035	0	6,725	1,291	
Lindeneau Elementary School	Copier - 110 15A	Bert 110X	2	13	8,760	2,035	6,725	0	2,035	0	6,725	175	
Lindeneau Elementary School	Charging Cart	Bert 110X	11	37	8,760	2,035	6,725	0	2,035	0	6,725	2,737	
Lindeneau Elementary School	Printer	Bert 110X	4	15	8,760	2,035	6,725	0	2,035	0	6,725	404	5,252
Lindeneau Elementary School	AC - 110V (15A)	Bert 110X	9	8	8,760	2,035	6,725	0	2,035	0	6,725	484	
Lindeneau Elementary School	AC - 220V (< 20A)	Bert 240I Inline	3	8	8,760	2,035	6,725	0	2,035	0	6,725	161	
Martin Luther King Elementary School	Smartboard TV	Bert 110X	22	8	8,760	2,035	6,725	0	2,035	0	6,725	1,184	
Martin Luther King Elementary School	Charging Cart	Bert 110X	12	37	8,760	2,035	6,725	0	2,035	0	6,725	2,986	
Martin Luther King Elementary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	6,698
Martin Luther King Elementary School	AC - 220V (< 20A)	Bert 240I Inline	7	8	8,760	2,035	6,725	0	2,035	0	6,725	377	
Washington Elementary School	Smartboard TV	Bert 110X	23	8	8,760	2,035	6,725	0	2,035	0	6,725	1,237	
Washington Elementary School	Charging Cart	Bert 110X	21	37	8,760	2,035	6,725	0	2,035	0	6,725	5,225	
Washington Elementary School	Printer	Bert 110X	2	15	8,760	2,035	6,725	0	2,035	0	6,725	202	
Washington Elementary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	9,603
Washington Elementary School	H/C Water Disp.	Bert 110X	1	61	8,760	2,035	6,725	0	2,035	0	6,725	410	
Washington Elementary School	AC - 110V (15A)	Bert 110X	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
Washington Elementary School	AC - 220V (< 20A)	Bert 240I Inline	6	8	8,760	2,035	6,725	0	2,035	0	6,725	323	
Woodbrook Elementary School	Smartboard TV	Bert 110X	42	8	8,760	2,035	6,725	0	2,035	0	6,725	2,260	
Woodbrook Elementary School	Charging Cart	Bert 110X	34	37	8,760	2,035	6,725	0	2,035	0	6,725	8,460	
Woodbrook Elementary School	Printer	Bert 110X	4	15	8,760	2,035	6,725	0	2,035	0	6,725	404	
Woodbrook Elementary School	H/C Water Disp.	Bert 110X	1	61	8,760	2,035	6,725	0	2,035	0	6,725	410	12,609
Woodbrook Elementary School	AC - 110V (15A)	Bert 110X	2	8	8,760	2,035	6,725	0	2,035	0	6,725	108	
Woodbrook Elementary School	AC - 220V (< 20A)	Bert 240I Inline	18	8	8,760	2,035	6,725	0	2,035	0	6,725	968	
FDR Round Building	Smartboard TV	Bert 110X	11	8	8,760	2,035	6,725	0	2,035	0	6,725	592	
FDR Round Building	Copier - 110 15A	Bert 110X	2	13	8,760	2,035	6,725	0	2,035	0	6,725	175	1,197
FDR Round Building	AC - 110V (15A)	Bert 110X	8	8	8,760	2,035	6,725	0	2,035	0	6,725	430	
Edison Early Learning Center	Smartboard TV	Bert 110X	3	8	8,760	2,035	6,725	0	2,035	0	6,725	161	
Edison Early Learning Center	Printer	Bert 110X	1	15	8,760	2,035	6,725	0	2,035	0	6,725	101	673
Edison Early Learning Center	H/C Water Disp.	Bert 110X	1	61	8,760	2,035	6,725	0	2,035	0	6,725	410	
Edison Education Center	Copier - 110 15A	Bert 110X	6	13	8,760	3,120	5,640	0	3,120	0	5,640	440	
Edison Education Center	Printer	Bert 110X	12	15	8,760	3,120	5,640	0	3,120	0	5,640	1,015	
Edison Education Center	Snack Vending	Bert 110X	1	40	8,760	3,120	5,640	0	3,120	0	5,640	226	4,518
Edison Education Center	Soda Vending	Bert 110X	1	320	8,760	3,120	5,640	0	3,120	0	5,640	1,805	
Edison Education Center	H/C Water Disp.	Bert 110X	3	61	8,760	3,120	5,640	0	3,120	0	5,640	1,032	
Building and Grounds	AC - 110V (15A)	Bert 110X	1	8	8,760	3,120	5,640	0	3,120	0	5,640	45	45

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Plug Load Controller Savings

BUILDING NAME	Device Type	Plug Load Type	Quantity	Standby Power Draw (W)	Hours per Year	Baseline Hours Scheduled ON per Year	Baseline Equipment on STANDBY Hours	Baseline No Power Draw (Unit Unplugged from outlet)	Proposed Equipment ON Hours per Year	Proposed Equipment on Standby Hours per	Proposed Equipment No Power Draw (BERT Controller cuts off power) Hours per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Edison High School	Desktop	Bert 110X	36	8	8,760	2,405	6,355	0	2,405	0	6,355	1,830	
Edison High School	Chromebook	Bert 110X	4	10	8,760	2,405	6,355	0	2,405	0	6,355	254	
Edison High School	Copier - 110 15A	Bert 110X	2	13	8,760	2,405	6,355	0	2,405	0	6,355	165	
Edison High School	Charging Cart	Bert 110X	1	37	8,760	2,405	6,355	0	2,405	0	6,355	235	
Edison High School	Printer	Bert 110X	20	15	8,760	2,405	6,355	0	2,405	0	6,355	1,907	
Edison High School	TV	Bert 110X	4	6	8,760	2,405	6,355	0	2,405	0	6,355	153	15,652
Edison High School	Snack Vending	Bert 110X	3	40	8,760	2,405	6,355	0	2,405	0	6,355	763	
Edison High School	Soda Vending	Bert 110X	4	320	8,760	2,405	6,355	0	2,405	0	6,355	8,134	
Edison High School	H/C Water Disp.	Bert 110X	4	61	8,760	2,405	6,355	0	2,405	0	6,355	1,551	
Edison High School	AC - 110V (15A)	Bert 110X	2	8	8,760	2,405	6,355	0	2,405	0	6,355	102	
Edison High School	AC - 220V (< 20A)	Bert 240I Inline	11	8	8,760	2,405	6,355	0	2,405	0	6,355	559	
John P. Stevens High School	Projector	Bert 110X	46	8	8,760	2,405	6,355	0	2,405	0	6,355	2,339	
John P. Stevens High School	Smartboard TV	Bert 110X	2	8	8,760	2,405	6,355	0	2,405	0	6,355	102	
John P. Stevens High School	Copier - 110 15A	Bert 110X	1	40	8,760	2,405	6,355	0	2,405	0	6,355	254	
John P. Stevens High School	Charging Cart	Bert 110X	3	37	8,760	2,405	6,355	0	2,405	0	6,355	705	
John P. Stevens High School	Printer	Bert 110X	8	15	8,760	2,405	6,355	0	2,405	0	6,355	763	
John P. Stevens High School	Snack Vending	Bert 110X	3	40	8,760	2,405	6,355	0	2,405	0	6,355	763	14,292
John P. Stevens High School	Soda Vending	Bert 110X	4	320	8,760	2,405	6,355	0	2,405	0	6,355	8,134	
John P. Stevens High School	H/C Water Disp.	Bert 110X	2	61	8,760	2,405	6,355	0	2,405	0	6,355	775	
John P. Stevens High School	AC - 110V (15A)	Bert 110X	3	8	8,760	2,405	6,355	0	2,405	0	6,355	153	
John P. Stevens High School	AC - 220V (< 20A)	Bert 240I Inline	6	8	8,760	2,405	6,355	0	2,405	0	6,355	305	
Herbert Hoover Middle School	Smartboard TV	Bert 110X	29	8	8,760	2,220	6,540	0	2,220	0	6,540	1,517	
Herbert Hoover Middle School	Copier - 110 15A	Bert 110X	1	40	8,760	2,220	6,540	0	2,220	0	6,540	262	
Herbert Hoover Middle School	Charging Cart	Bert 110X	12	37	8,760	2,220	6,540	0	2,220	0	6,540	2,904	
Herbert Hoover Middle School	Printer	Bert 110X	2	15	8,760	2,220	6,540	0	2,220	0	6,540	196	
Herbert Hoover Middle School	Snack Vending	Bert 110X	1	40	8,760	2,220	6,540	0	2,220	0	6,540	262	11,046
Herbert Hoover Middle School	Soda Vending	Bert 110X	2	320	8,760	2,220	6,540	0	2,220	0	6,540	4,186	
Herbert Hoover Middle School	H/C Water Disp.	Bert 110X	3	61	8,760	2,220	6,540	0	2,220	0	6,540	1,197	
Herbert Hoover Middle School	AC - 220V (< 20A)	Bert 240I Inline	10	8	8,760	2,220	6,540	0	2,220	0	6,540	523	
John Adams Middle School	Smartboard TV	Bert 110X	12	8	8,760	2,220	6,540	0	2,220	0	6,540	628	
John Adams Middle School	Projector/Smartboard	Bert 110X	25	10	8,760	2,220	6,540	0	2,220	0	6,540	1,635	
John Adams Middle School	Charging Cart	Bert 110X	4	37	8,760	2,220	6,540	0	2,220	0	6,540	968	
John Adams Middle School	Printer	Bert 110X	9	15	8,760	2,220	6,540	0	2,220	0	6,540	883	
John Adams Middle School	Snack Vending	Bert 110X	2	40	8,760	2,220	6,540	0	2,220	0	6,540	523	9,241
John Adams Middle School	Soda Vending	Bert 110X	2	320	8,760	2,220	6,540	0	2,220	0	6,540	4,186	
John Adams Middle School	AC - 220V (< 20A)	Bert 240I Inline	8	8	8,760	2,220	6,540	0	2,220	0	6,540	419	
Thomas Jefferson Middle School	Projector	Bert 110X	26	8	8,760	2,220	6,540	0	2,220	0	6,540	1,360	
Thomas Jefferson Middle School	Smartboard TV	Bert 110X	9	8	8,760	2,220	6,540	0	2,220	0	6,540	471	
Thomas Jefferson Middle School	Copier - 110 15A	Bert 110X	1	13	8,760	2,220	6,540	0	2,220	0	6,540	85	
Thomas Jefferson Middle School	Charging Cart	Bert 110X	24	37	8,760	2,220	6,540	0	2,220	0	6,540	5,808	
Thomas Jefferson Middle School	Printer	Bert 110X	4	15	8,760	2,220	6,540	0	2,220	0	6,540	392	
Thomas Jefferson Middle School	Snack Vending	Bert 110X	1	40	8,760	2,220	6,540	0	2,220	0	6,540	262	15,945
Thomas Jefferson Middle School	Soda Vending	Bert 110X	3	320	8,760	2,220	6,540	0	2,220	0	6,540	6,278	
Thomas Jefferson Middle School	H/C Water Disp.	Bert 110X	1	61	8,760	2,220	6,540	0	2,220	0	6,540	399	
Thomas Jefferson Middle School	AC - 110V (15A)	Bert 110X	12	8	8,760	2,220	6,540	0	2,220	0	6,540	628	
Thomas Jefferson Middle School	AC - 220V (< 20A)	Bert 240I Inline	5	8	8,760	2,220	6,540	0	2,220	0	6,540	262	
Woodrow Wilson Middle School	Smartboard TV	Bert 110X	22	8	8,760	2,220	6,540	0	2,220	0	6,540	1,151	
Woodrow Wilson Middle School	Projector/Smartboard	Bert 110X	28	10	8,760	2,220	6,540	0	2,220	0	6,540	1,831	
Woodrow Wilson Middle School	Charging Cart	Bert 110X	4	37	8,760	2,220	6,540	0	2,220	0	6,540	968	
Woodrow Wilson Middle School	Printer	Bert 110X	9	15	8,760	2,220	6,540	0	2,220	0	6,540	883	
Woodrow Wilson Middle School	TV	Bert 110X	2	6	8,760	2,220	6,540	0	2,220	0	6,540	78	10,196
Woodrow Wilson Middle School	Snack Vending	Bert 110X	1	40	8,760	2,220	6,540	0	2,220	0	6,540	262	
Woodrow Wilson Middle School	Soda Vending	Bert 110X	2	320	8,760	2,220	6,540	0	2,220	0	6,540	4,186	
Woodrow Wilson Middle School	AC - 110V (15A)	Bert 110X	3	8	8,760	2,220	6,540	0	2,220	0	6,540	157	
Woodrow Wilson Middle School	AC - 220V (< 20A)	Bert 240I Inline	13	8	8,760	2,220	6,540	0	2,220	0	6,540	680	
Benjamin Franklin Elementary School	Projector	Bert 110X	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
Benjamin Franklin Elementary School	Smartboard TV	Bert 110X	20	8	8,760	2,035	6,725	0	2,035	0	6,725	1,076	
Benjamin Franklin Elementary School	Charging Cart	Bert 110X	22	37	8,760	2,035	6,725	0	2,035	0	6,725	5,474	
Benjamin Franklin Elementary School	Printer	Bert 110X	4	15	8,760	2,035	6,725	0	2,035	0	6,725	404	
Benjamin Franklin Elementary School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	10,451
Benjamin Franklin Elementary School	AC - 110V (15A)	Bert 110X	3	8	8,760	2,035	6,725	0	2,035	0	6,725	161	
Benjamin Franklin Elementary School	AC - 110V (20A)	Bert 240I Inline	1	8	8,760	2,035	6,725	0	2,035	0	6,725	54	
Benjamin Franklin Elementary School	AC - 220V (< 20A)	Bert 240I Inline	20	8	8,760	2,035	6,725	0	2,035	0	6,725	1,076	
James Madison Intermediate School	Smartboard TV	Bert 110X	18	8	8,760	2,035	6,725	0	2,035	0	6,725	968	
James Madison Intermediate School	Charging Cart	Bert 110X	13	37	8,760	2,035	6,725	0	2,035	0	6,725	3,235	
James Madison Intermediate School	Printer	Bert 110X	2	15	8,760	2,035	6,725	0	2,035	0	6,725	202	
James Madison Intermediate School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	0	2,035	0	6,725	2,152	6,987
James Madison Intermediate School	AC - 110V (15A)	Bert 110X	3	8	8,760	2,035	6,725	0	2,035	0	6,725	161	
James Madison Intermediate School	AC - 220V (< 20A)	Bert 240I Inline	5	8	8,760	2,035	6,725	0	2,035	0	6,725	269	

ECM 13 – PC Power Management

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
13 PC Power Management	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Background

PC power management refers to software-based mechanisms for controlling the power use of personal computer hardware. This is typically through the use of software that puts the hardware into the lowest power demand state available. A typical office PC uses about 90 watts when active (approximately 50 watts for the base unit, and 40 watts for a typical LCD screen); and three to four watts when 'asleep'. Up to 10% of a modern office's electricity demand can be due to PCs and monitors.

While most PCs allow low power settings, there are frequently situations, especially in a networked environment, where processes running on the computer will prevent the low power settings from taking effect. This can have a dramatic effect on energy use that is invisible to the user. Operational testing has shown that on any given day an average of over 50% of an organization's computers will fail to go to sleep, and over long periods of time this affects over 90% of machines.

Scope of Work

Add PC power management technology to computers located at the following locations:

PC Savings		
BUILDING NAME	Device Type	Quantity
Edison High School	Desktop	450
Edison High School	Laptop	510
Edison High School	Chromebook	
John P. Stevens High School	Desktop	402
John P. Stevens High School	Laptop	
John P. Stevens High School	Chromebook	
Herbert Hoover Middle School	Desktop	55
Herbert Hoover Middle School	Laptop	5
Herbert Hoover Middle School	Chromebook	
John Adams Middle School	Desktop	38
John Adams Middle School	Laptop	175.5
John Adams Middle School	Chromebook	
Thomas Jefferson Middle School	Desktop	31.25
Thomas Jefferson Middle School	Laptop	157.25
Thomas Jefferson Middle School	Chromebook	
Woodrow Wilson Middle School	Desktop	150
Woodrow Wilson Middle School	Laptop	70
Woodrow Wilson Middle School	Chromebook	
Benjamin Franklin Elementary School	Desktop	62.5
Benjamin Franklin Elementary School	Laptop	
Benjamin Franklin Elementary School	Chromebook	
James Madison Intermediate School	Desktop	31
James Madison Intermediate School	Laptop	
James Madison Intermediate School	Chromebook	
James Madison Primary School	Desktop	87
James Madison Primary School	Laptop	2
James Madison Primary School	Chromebook	
James Monroe Elementary School	Desktop	90
James Monroe Elementary School	Laptop	0
James Monroe Elementary School	Chromebook	
John Marshall Elementary School	Desktop	92
John Marshall Elementary School	Laptop	
John Marshall Elementary School	Chromebook	
Lincoln Elementary School	Desktop	135
Lincoln Elementary School	Laptop	37.5
Lincoln Elementary School	Chromebook	
Lindeneau Elementary School	Desktop	145
Lindeneau Elementary School	Laptop	75
Lindeneau Elementary School	Chromebook	
Martin Luther King Elementary School	Desktop	72.5
Martin Luther King Elementary School	Laptop	35
Martin Luther King Elementary School	Chromebook	
Washington Elementary School	Desktop	125
Washington Elementary School	Laptop	35
Washington Elementary School	Chromebook	
Woodbrook Elementary School	Desktop	62.5
Woodbrook Elementary School	Laptop	314.5
Woodbrook Elementary School	Chromebook	
FDR Round Building	Desktop	12
FDR Round Building	Laptop	
FDR Round Building	Chromebook	
Edison Early Learning Center	Desktop	11
Edison Early Learning Center	Laptop	
Edison Early Learning Center	Chromebook	
Edison Education Center	Desktop	106
Edison Education Center	Laptop	125
Edison Education Center	Chromebook	
Building and Grounds	Desktop	4
Building and Grounds	Laptop	
Building and Grounds	Chromebook	

ECM Calculations

PC Savings							
BUILDING NAME	Quantity	Power Draw (W)	Standby Power Draw (W)	Hours per Year	Baseline Hours Scheduled ON per Year	Baseline Equipment on STANDBY Hour	Baseline No Power Draw
Edison High School	450	200	80	8,760	840	3,240	4,680
Edison High School	510	70	28	8,760	840	960	6960
Edison High School							
John P. Stevens High School	402	200	80	8,760	840	3,240	4,680
John P. Stevens High School		70	28	8,760	840	960	6960
John P. Stevens High School				8,760	840		7920
Herbert Hoover Middle School	55	200	80	8,760	840	3,240	4,680
Herbert Hoover Middle School	5	70	28	8,760	840	960	6960
Herbert Hoover Middle School				8,760	840		7920
John Adams Middle School	38	200	80	8,760	840	3,240	4,680
John Adams Middle School	175.5	70	28	8,760	840	960	6960
John Adams Middle School				8,760	840		7920
Thomas Jefferson Middle School	31.25	200	80	8,760	840	3,240	4,680
Thomas Jefferson Middle School	157.25	70	28	8,760	840	960	6960
Thomas Jefferson Middle School				8,760	840		7920
Woodrow Wilson Middle School	150	200	80	8,760	840	3,240	4,680
Woodrow Wilson Middle School	70	70	28	8,760	840	960	6960
Woodrow Wilson Middle School				8,760	840		7920
Benjamin Franklin Elementary School	62.5	200	80	8,760	840	3,240	4,680
Benjamin Franklin Elementary School		70	28	8,760	840	960	6960
Benjamin Franklin Elementary School				8,760	840		7920
James Madison Intermediate School	31	200	80	8,760	840	3,240	4,680
James Madison Intermediate School		70	28	8,760	840	960	6960
James Madison Intermediate School				8,760	840		7920
James Madison Primary School	87	200	80	8,760	840	3,240	4,680
James Madison Primary School	2	70	28	8,760	840	960	6960
James Madison Primary School				8,760	840		7920
James Monroe Elementary School	90	200	80	8,760	840	3,240	4,680
James Monroe Elementary School	0	70	28	8,760	840	960	6960
James Monroe Elementary School				8,760	840		7920
John Marshall Elementary School	92	200	80	8,760	840	3,240	4,680
John Marshall Elementary School		70	28	8,760	840	960	6960
John Marshall Elementary School				8,760	840		7920
Lincoln Elementary School	135	200	80	8,760	840	3,240	4,680
Lincoln Elementary School	37.5	70	28	8,760	840	960	6960
Lincoln Elementary School				8,760	840		7920
Lindeneau Elementary School	145	200	80	8,760	840	3,240	4,680
Lindeneau Elementary School	75	70	28	8,760	840	960	6960
Lindeneau Elementary School				8,760	840		7920
Martin Luther King Elementary School	72.5	200	80	8,760	840	3,240	4,680
Martin Luther King Elementary School	35	70	28	8,760	840	960	6960
Martin Luther King Elementary School				8,760	840		7920
Washington Elementary School	125	200	80	8,760	840	3,240	4,680
Washington Elementary School	35	70	28	8,760	840	960	6960
Washington Elementary School				8,760	840		7920
Woodbrook Elementary School	62.5	200	80	8,760	840	3,240	4,680
Woodbrook Elementary School	314.5	70	28	8,760	840	960	6960
Woodbrook Elementary School				8,760	840		7920
FDR Round Building	12	200	80	8,760	840	3,240	4,680
FDR Round Building		70	28	8,760	840	960	6960
FDR Round Building				8,760	840		7920
Edison Early Learning Center	11	200	80	8,760	840	3,240	4,680
Edison Early Learning Center		70	28	8,760	840	960	6960
Edison Early Learning Center				8,760	840		7920
Edison Education Center	106	200	80	8,760	840	3,240	4,680
Edison Education Center	125	70	28	8,760	840	960	6960
Edison Education Center				8,760	840		7920
Building and Grounds	4	200	80	8,760	840	3,240	4,680
Building and Grounds		70	28	8,760	840	960	6960
Building and Grounds				8,760	840		7920

PC Savings

BUILDING NAME	Proposed Equipment ON Hours per Year	Proposed Equipment on Standby Hours per Year	Proposed Equipment No Power Draw (BERT Controller cuts off power) Hours per Year	Baseline Energy Use (kWh)	Proposed Energy Use (kWh)	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Edison High School	840	2430	5,490	192,240	163,080	29,160	31,902
Edison High School	840	768	7,152	43,697	40,955	2,742	
Edison High School							
John P. Stevens High School	840	2430	5,490	171,734	145,685	26,050	26,050
John P. Stevens High School	840	768	7,152	00	00	0	
John P. Stevens High School	840	0					
Herbert Hoover Middle School	840	2430	5,490	23,496	19,932	3,564	3,591
Herbert Hoover Middle School	840	768	7,152	428	402	27	
Herbert Hoover Middle School	840	0					
John Adams Middle School	840	2430	5,490	16,234	13,771	2,462	3,406
John Adams Middle School	840	768	7,152	15,037	14,093	943	
John Adams Middle School	840	0					
Thomas Jefferson Middle School	840	2430	5,490	13,350	11,325	2,025	2,870
Thomas Jefferson Middle School	840	768	7,152	13,473	12,628	845	
Thomas Jefferson Middle School	840	0					
Woodrow Wilson Middle School	840	2430	5,490	64,080	54,360	9,720	10,096
Woodrow Wilson Middle School	840	768	7,152	5,998	5,621	376	
Woodrow Wilson Middle School	840	0					
Benjamin Franklin Elementary School	840	2430	5,490	26,700	22,650	4,050	4,050
Benjamin Franklin Elementary School	840	768	7,152	00	00	0	
Benjamin Franklin Elementary School	840	0					
James Madison Intermediate School	840	2430	5,490	13,243	11,234	2,009	2,009
James Madison Intermediate School	840	768	7,152	00	00	0	
James Madison Intermediate School	840	0					
James Madison Primary School	840	2430	5,490	37,166	31,529	5,638	5,648
James Madison Primary School	840	768	7,152	171	161	11	
James Madison Primary School	840	0					
James Monroe Elementary School	840	2430	5,490	38,448	32,616	5,832	5,832
James Monroe Elementary School	840	768	7,152	00	00	0	
James Monroe Elementary School	840	0					
John Marshall Elementary School	840	2430	5,490	39,302	33,341	5,962	5,962
John Marshall Elementary School	840	768	7,152	00	00	0	
John Marshall Elementary School	840	0					
Lincoln Elementary School	840	2430	5,490	57,672	48,924	8,748	8,950
Lincoln Elementary School	840	768	7,152	3,213	3,011	202	
Lincoln Elementary School	840	0					
Lindeneau Elementary School	840	2430	5,490	61,944	52,548	9,396	9,799
Lindeneau Elementary School	840	768	7,152	6,426	6,023	403	
Lindeneau Elementary School	840	0					
Martin Luther King Elementary School	840	2430	5,490	30,972	26,274	4,698	4,886
Martin Luther King Elementary School	840	768	7,152	2,999	2,811	188	
Martin Luther King Elementary School	840	0					
Washington Elementary School	840	2430	5,490	53,400	45,300	8,100	8,288
Washington Elementary School	840	768	7,152	2,999	2,811	188	
Washington Elementary School	840	0					
Woodbrook Elementary School	840	2430	5,490	26,700	22,650	4,050	5,741
Woodbrook Elementary School	840	768	7,152	26,946	25,256	1,691	
Woodbrook Elementary School	840	0					
FDR Round Building	840	2430	5,490	5,126	4,349	778	778
FDR Round Building	840	768	7,152	00	00	0	
FDR Round Building	840	0					
Edison Early Learning Center	840	2430	5,490	4,699	3,986	713	713
Edison Early Learning Center	840	768	7,152	00	00	0	
Edison Early Learning Center	840	0					
Edison Education Center	840	2430	5,490	45,283	38,414	6,869	7,541
Edison Education Center	840	768	7,152	10,710	10,038	672	
Edison Education Center	840	0					
Building and Grounds	840	2430	5,490	1,709	1,450	259	259
Building and Grounds	840	768	7,152	00	00	0	
Building and Grounds	840	0					

ECM 14 – Solar PPA

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
14 Solar PPA	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

The renewable energy industry is one of the fastest growing and evolving components to modern building system design. The ability to capture solar energy will provide long term economic and environmental benefits. Technology improvements are rapidly evolving as well, and the market is flooded with new products with new features that have only been available within the last few years, with promising new technologies and updates on the verge of becoming available to the market.

Photovoltaic (PV) solar array

Clients have the opportunity to purchase power through a Power Purchase Agreement, predetermining fixed low rates for the duration of the agreement, without having to manage any part of the process. This allows the solar provider to manage compliance reporting, filings, and maintenance of the equipment for the entire length of the contract.

A solar PPA makes going green easy. Work takes place around the client's schedule, and a safe and functional environment is maintained throughout installation of the system.

Assessment
A preliminary assessment of your facilities will allow for the design of a system that meets your energy needs and environmental goals

Agreement
Power Purchase Agreements allow for the sale of the energy produced on a per kWh basis, while a lease agreement allows the solar provider to access the system they own so that they may monitor and maintain the system for you.

Installation
A turnkey system includes the design, construction, commissioning, and interconnection with local utilities.

Monitoring
The solar provider monitors the PV installation to ensure performance and for ease of billing. The client has the capability to track output and environmental benefits online.

Management
The solar provider handles all compliance and reporting requirements for the client. They will file documentation with federal and state agencies and participate in state and utility REC markets.

Scope of Work

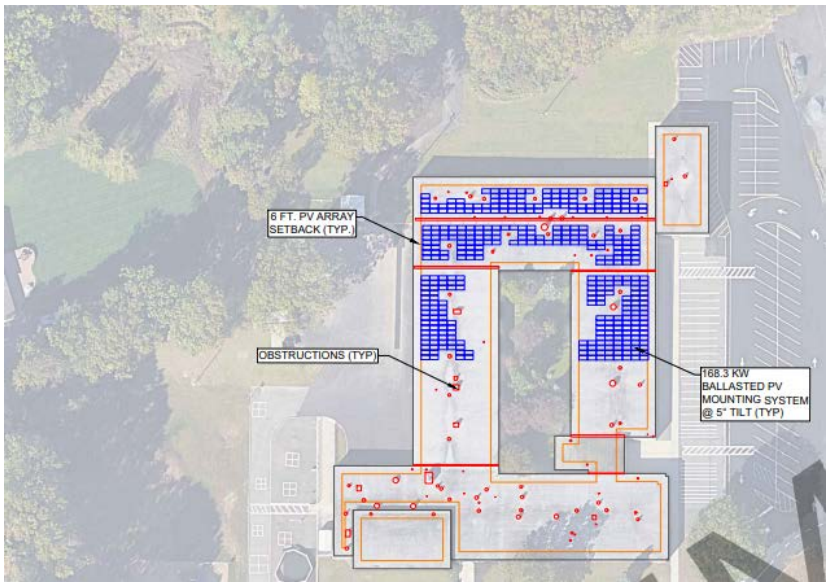
- Savings estimates are calculated from proposals received during the Edison Twp BOE Solar RFP Response
- Installation of the Solar PV System shall be in accordance with NFPA 70. NEC 2011. ARTICLE 690.Solar Photovoltaic (PV) Systems
- PPA Firm will receive any incentives available

Solar PPA - Rates & Savings				
BUILDING	MOUNTING CATEGORY	INSTALLED ARRAY (kW)	EFLH	INSTALLED kWh GENERATION
Edison High School	Roof	781.20	1,241	969,469
John P. Stevens High School	Roof	1,261.26	1,236	1,558,754
Herbert Hoover Middle School	Roof	319.50	1,241	396,500
John Adams Middle School	Roof	261.90	1,242	325,280
Thomas Jefferson Middle School	Roof	253.35	1,250	316,688
Woodrow Wilson Middle School	Roof	420.92	1,243	523,198
Benjamin Franklin Elementary School	Roof	86.43	1,245	107,610
James Madison Intermediate School	Roof	313.34	1,237	387,595
James Madison Primary School	Roof	158.40	1,237	195,941
James Monroe Elementary School	Roof	245.70	1,234	303,194
John Marshall Elementary School	Roof	217.17	1,241	269,508
Lincoln Elementary School	Roof	213.84	1,247	266,659
Lindeneau Elementary School	Roof	88.02	1,236	108,788
Martin Luther King Elementary School	Roof	135.85	1,227	166,690
Washington Elementary School	Roof	170.55	1,243	211,994
Woodbrook Elementary School	Roof	305.10	1,231	375,578
FDR Round Building	Roof	0.00	0	0
Edison Early Learning Center	Roof	49.50	1,234	61,083
Edison Education Center	Roof	128.59	1,241	159,577
Building and Grounds	Roof	34.20	1,214	41,519

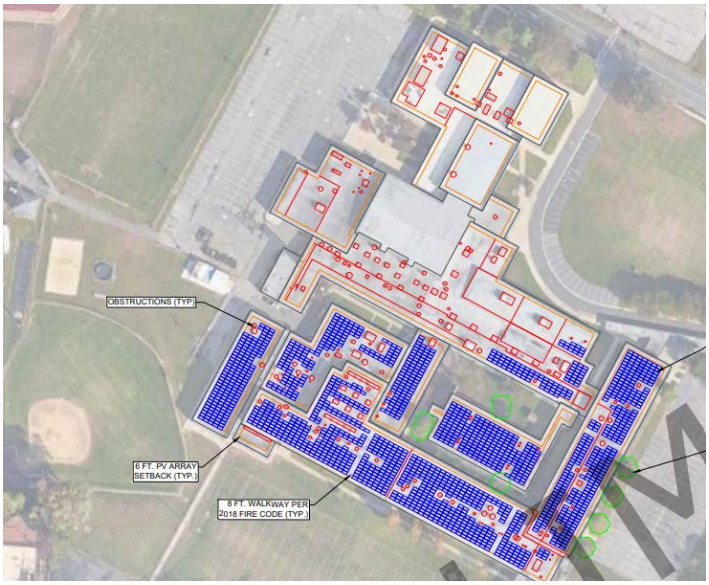
Solar Photovoltaic Arrays

Edison Twp BOE roof mounted solar opportunities are show below:

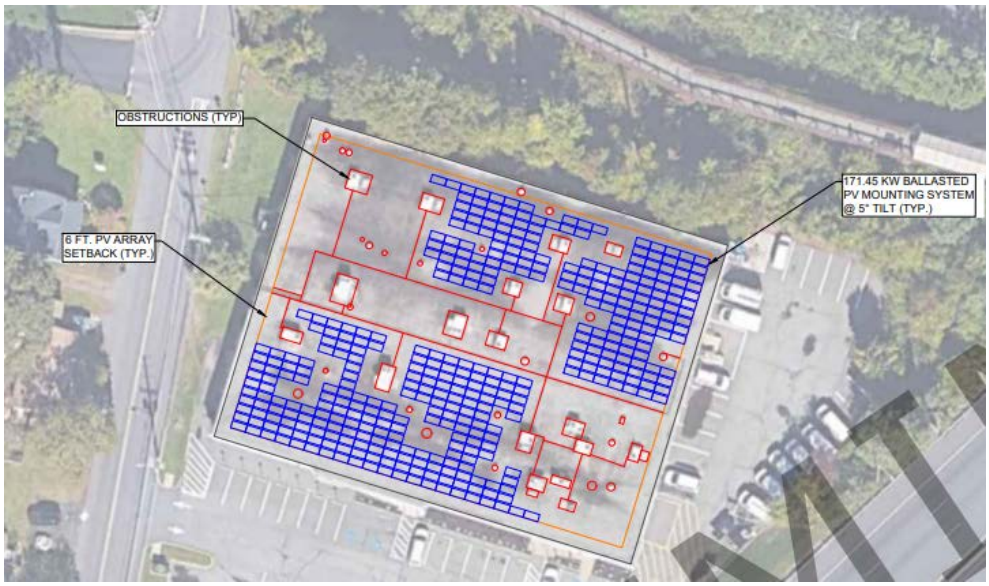
Benjamin Franklin Elementary School



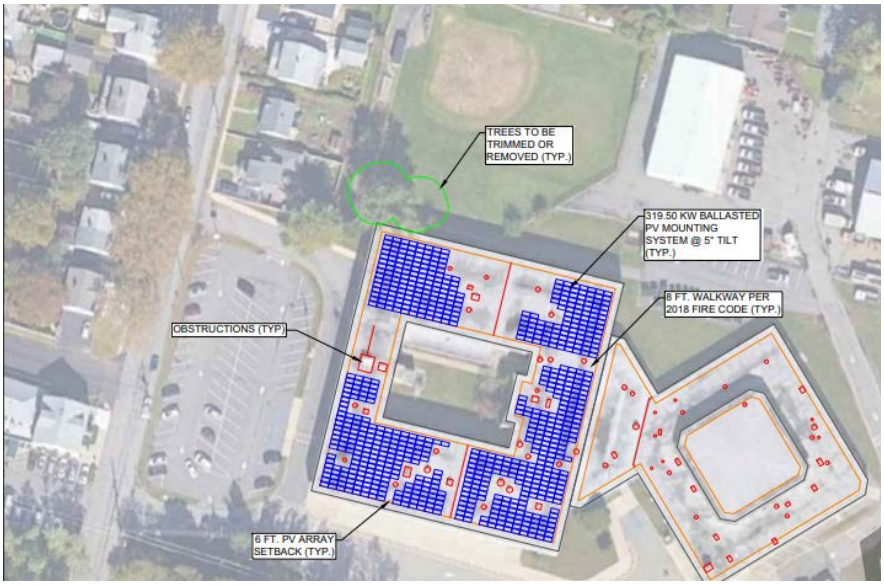
Edison High School



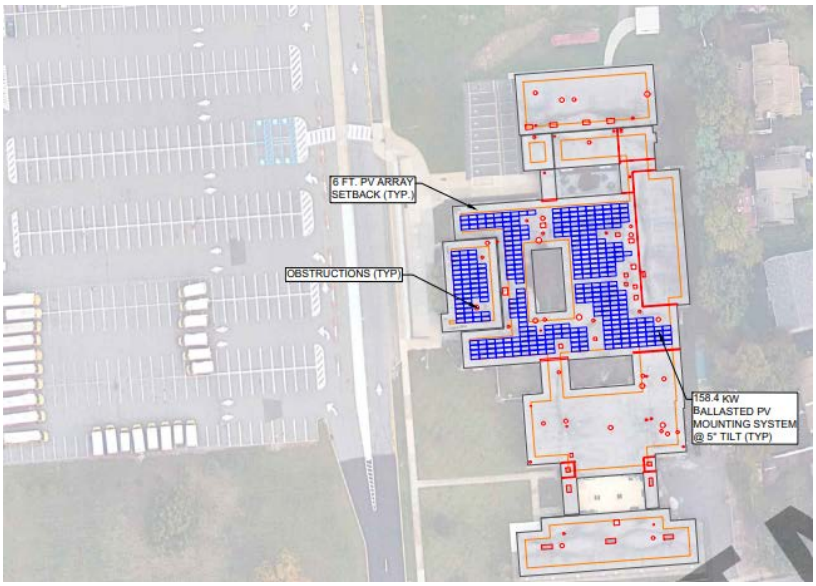
Edison Education Center



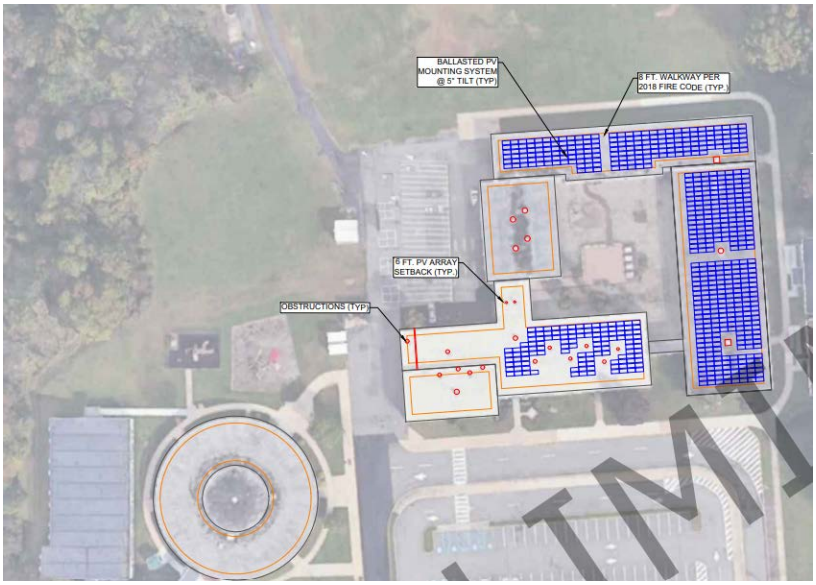
Herbert Hoover Middle School



James Madison Primary School

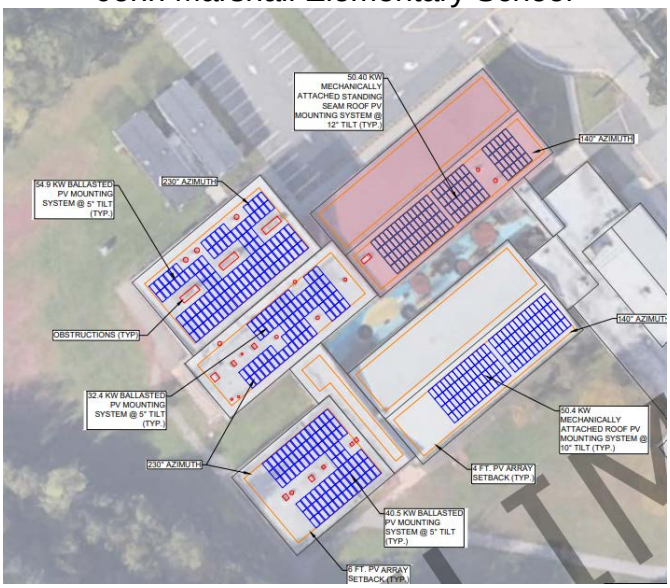


James Madison Intermediate School



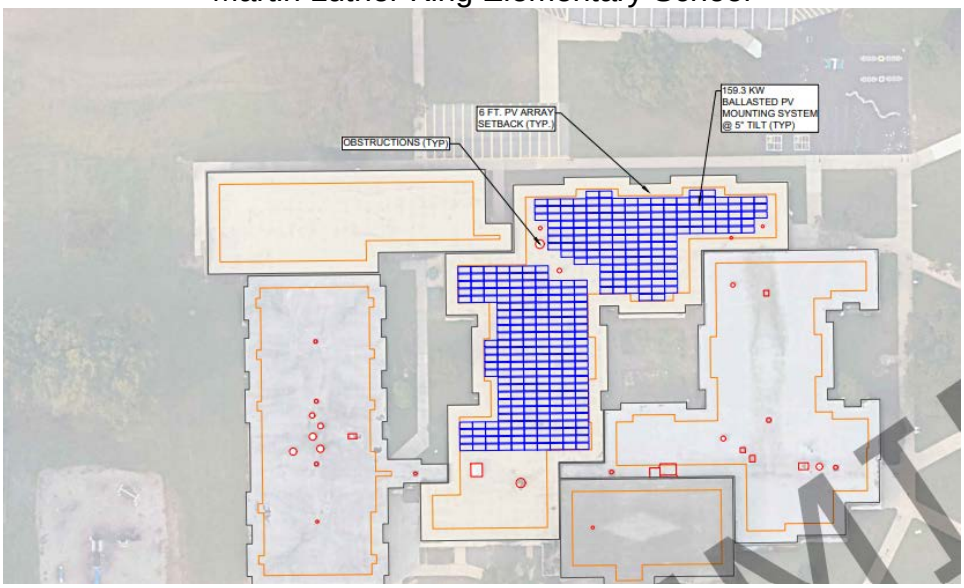
John Adams Middle School

John Marshall Elementary School

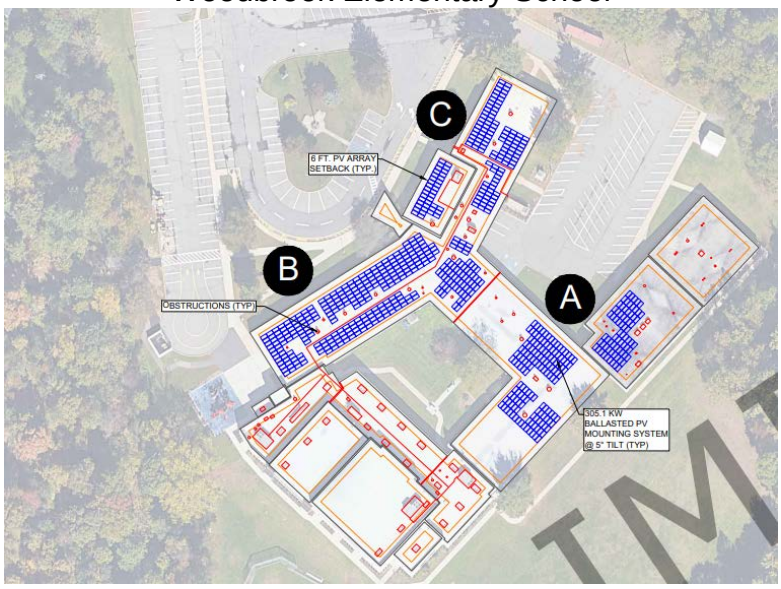


John P. Stevens High School

Martin Luther King Elementary School

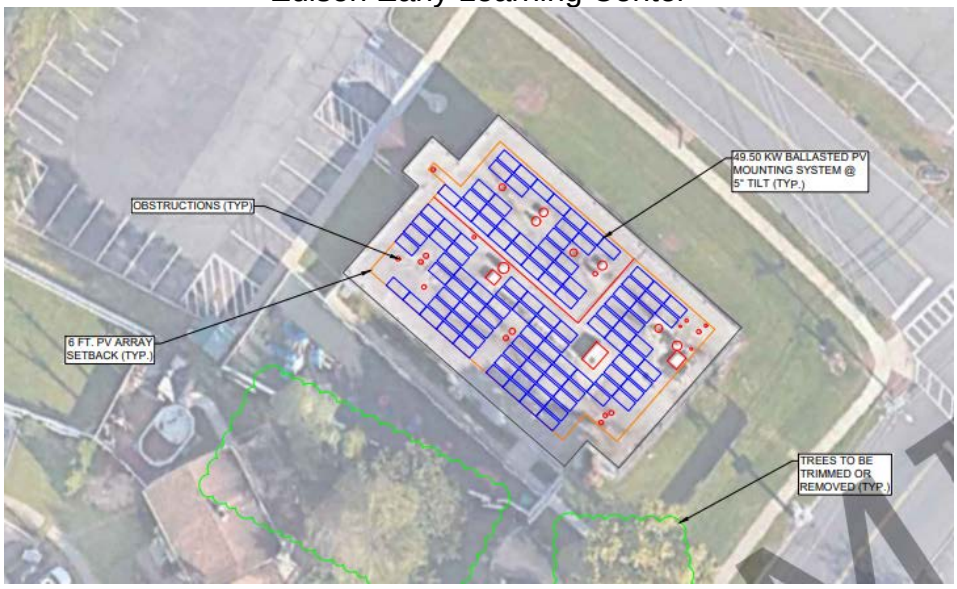


Woodbrook Elementary School

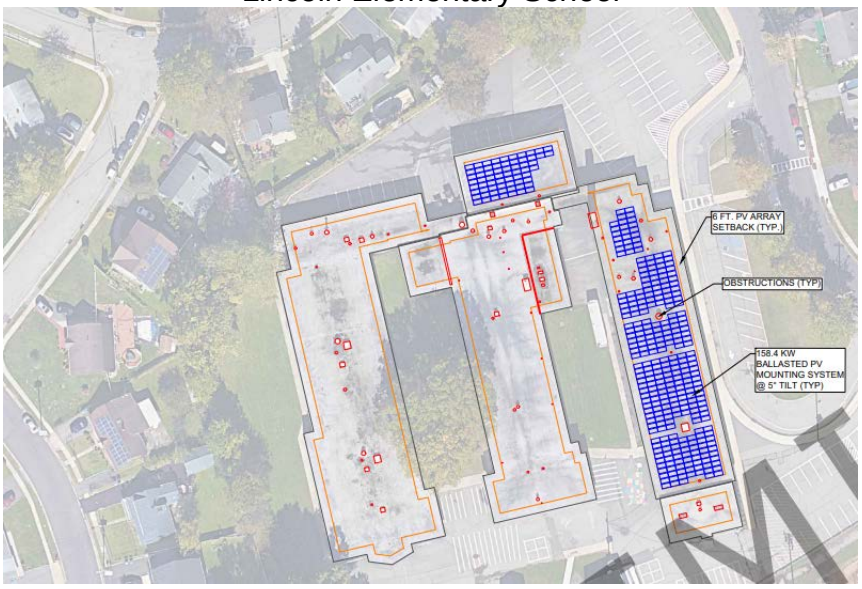


Woodrow Wilson Elementary School

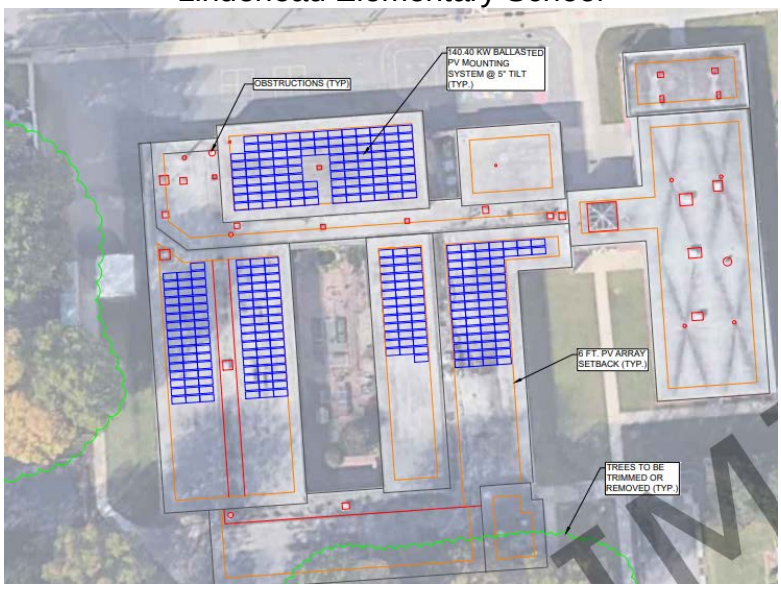
Edison Early Learning Center



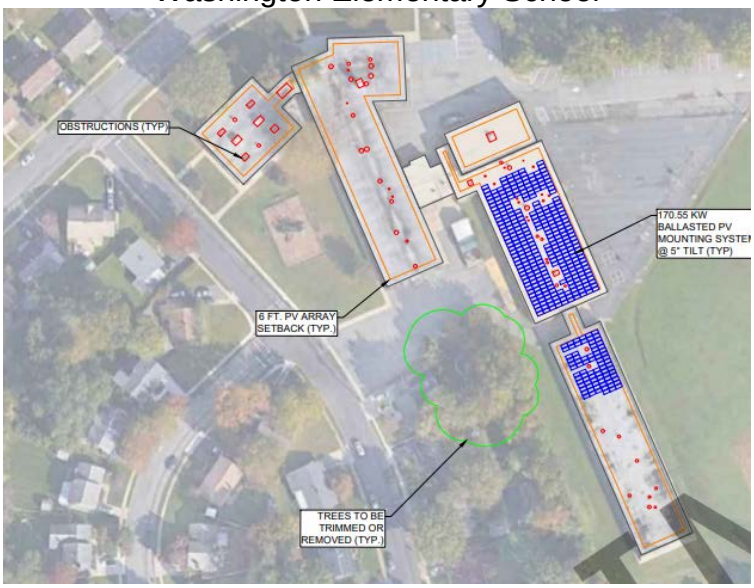
Lincoln Elementary School



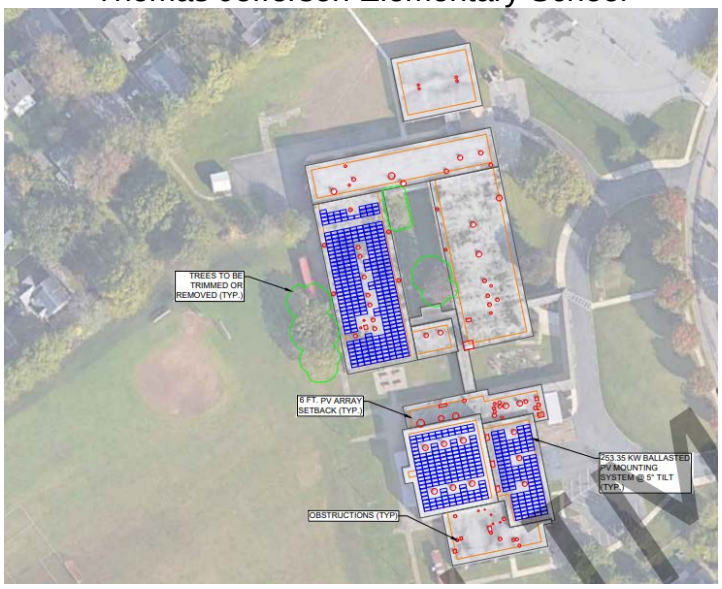
Lindeneau Elementary School



Washington Elementary School

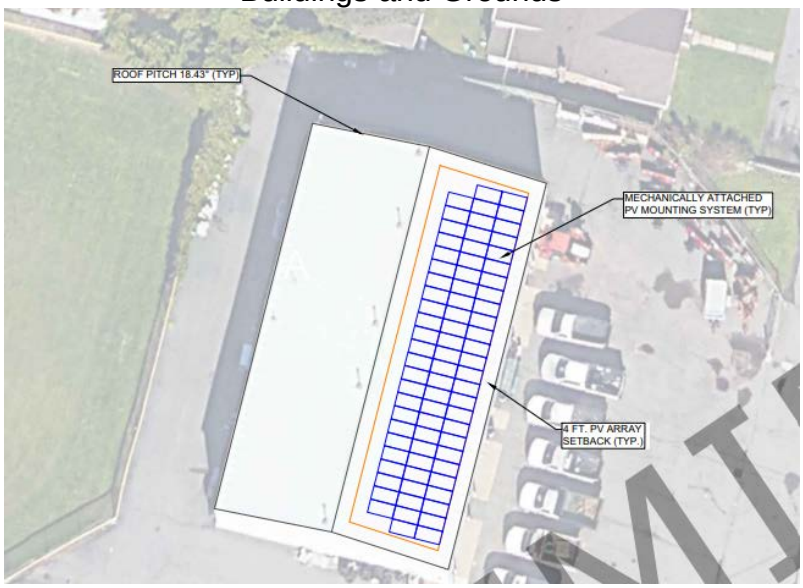


Thomas Jefferson Elementary School



James Monroe Elementary School

Buildings and Grounds



ECM Calculations

The energy savings shown below are a result of the reduced electrical cost from the PPA for the kWh generated by the solar panels. Actual rates and solar generation estimates were taken from the awarded bidder during the Edison Twp BOE Solar PPA RFP process. A comparison was done to ensure the generated kWh did not exceed the post-project estimated energy consumption. In cases where the generated kWh exceeded the post-project electrical consumption, the generation numbers were reduced to ensure the site would not generate more electric than it consumes. The PPA term is 15 years.

Solar PPA - Rates & Savings

BUILDING	MOUNTING CATEGORY	INSTALLED ARRAY (kW)	EFLH	INSTALLED kWh GENERATION	UTILITY	UTILITY SAVINGS	SOLAR PPA	SOLAR EXPENSE	SAVINGS
Edison High School	Roof	781.20	1,241	969,469	$0.190	$184,199	$0.0285	$27,630	$156,569
John P. Stevens High School	Roof	1,261.26	1,236	1,558,754	$0.183	$285,252	$0.0285	$44,424	$240,827
Herbert Hoover Middle School	Roof	319.50	1,241	396,500	$0.130	$51,545	$0.0285	$11,300	$40,245
John Adams Middle School	Roof	261.90	1,242	325,280	$0.115	$37,407	$0.0285	$9,270	$28,137
Thomas Jefferson Middle School	Roof	253.35	1,250	316,688	$0.098	$31,035	$0.0285	$9,026	$22,010
Woodrow Wilson Middle School	Roof	420.92	1,243	523,198	$0.085	$44,472	$0.0285	$14,911	$29,561
Benjamin Franklin Elementary School	Roof	86.43	1,245	107,610	$0.108	$11,622	$0.0285	$3,067	$8,555
James Madison Intermediate School	Roof	313.34	1,237	387,595	$0.121	$46,899	$0.0285	$11,046	$35,853
James Madison Primary School	Roof	158.40	1,237	195,941	$0.151	$29,587	$0.0285	$5,584	$24,003
James Monroe Elementary School	Roof	245.70	1,234	303,194	$0.103	$31,227	$0.0285	$8,641	$22,586
John Marshall Elementary School	Roof	217.17	1,241	269,508	$0.187	$50,398	$0.0285	$7,681	$42,717
Lincoln Elementary School	Roof	213.84	1,247	266,659	$0.129	$34,399	$0.0285	$7,600	$26,799
Lindeneau Elementary School	Roof	88.02	1,236	108,788	$0.159	$17,297	$0.0285	$3,100	$14,197
Martin Luther King Elementary School	Roof	135.85	1,227	166,690	$0.159	$26,504	$0.0285	$4,751	$21,753
Washington Elementary School	Roof	170.55	1,243	211,994	$0.123	$26,075	$0.0285	$6,042	$20,033
Woodbrook Elementary School	Roof	305.10	1,231	375,578	$0.135	$50,642	$0.0285	$10,704	$39,938
FDR Round Building	Roof	0.00	0	0	$0.096	$0	$0.0285	$0	$0
Edison Early Learning Center	Roof	49.50	1,234	61,083	$0.155	$9,476	$0.0285	$1,741	$7,736
Edison Education Center	Roof	128.59	1,241	159,577	$0.123	$19,652	$0.0285	$4,548	$15,104
Building and Grounds	Roof	34.20	1,214	41,519	$0.122	$5,085	$0.0285	$1,183	$3,902

ECM 15 – Combined Heat & Power

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
15 – Combined Heat & Power Unit		✔																		

CHP offers energy and environmental benefits over electric-only and thermal-only systems in both central and distributed power generation applications. CHP systems have the potential for a wide range of applications and the higher efficiencies result in lower emissions than separate heat and power generation.

The simultaneous production of useful thermal and electrical energy in CHP systems lead to increased fuel efficiency. CHP units can be strategically located at the point of energy use. Such onsite generation avoids the transmission and distribution losses associated with electricity purchased via the grid from central stations. CHP is versatile and can be coupled with existing and planned technologies for many different applications in the industrial, commercial, and residential sectors.

The following CHP will be installed at J.P. Stevens High School.

BUILDING	CATEGORY	QUANTITY
John P. Stevens High School	Yanmar CP35D1-TNUW - Non-Black Start Capable, Radiator-LESS	1
	Thermal Load Module to interface with building's space heating systems	

ECM Calculations

The CHP will act as the first stage of heating for the hot water heating loop. The CHP is estimated to run at full load for over 3,443 hours per year. Run hours were verified to be achievable using eQuest simulations where a 35 kW CHP was proposed at a similar building. Non-displaceable gas use is associated with other gas loads at the building - (kitchen appliances, gas-fired RTUs, etc. The remaining load is available for the CHP. The installed CHP will be available year-round and will be designed to run the CHP when full electric and heat loads exist simultaneously.

CHP Input Data		
Number of units	1	
Electrical output	35	kW
Thermal output	204,040	BTU/hr
Gas input (HHV)	407,144	Btu/hr
Overall efficiency	79.4%	

		Fuel Usage Without CHP					
Month	Days	Total Gas (therms) - Post ECMs	Post ESIP Boiler Efficiency	Gas Therms - Percentage of total building gas use	Non-Displaceable Gas Therms	Displaceable Gas Therms	Displaceable Heat Therms
Jan	31	14,703	87%	90%	1,470	13,233	11,513
Feb	28	13,201	87%	90%	1,320	11,881	10,337
Mar	31	12,501	87%	90%	1,250	11,251	9,788
Apr	30	7,613	87%	0%	7,613	0	0
May	31	1,358	87%	0%	1,358	0	0
Jun	30	561	87%	0%	561	0	0
Jul	31	389	87%	0%	389	0	0
Aug	31	396	87%	0%	396	0	0
Sep	30	547	87%	0%	547	0	0
Oct	31	6,175	87%	90%	618	5,558	4,835
Nov	30	10,286	87%	90%	1,029	9,257	8,054
Dec	31	15,964	87%	90%	1,596	14,368	12,500
Total:	**365**	**83,696**			**18,147**	**65,548**	**57,027**

		35 kW Cogen Plant Thermal Operation											
Month	Days	Combined Cogen Run Hours	Max Daily Run Hours w/ Heat Dump	% Heat Load Displaced by CHP	Cogen Dump Hours	Total Cogen Hours	Utilized Cogen Heat Therms	Dumped Cogen Heat Therms	Max Cogen Heat Therms	Avoided Boiler Gas Therms	Full Load Run Hours	System Operating Efficiency
Jan	31	707	22.8	13%	0	707	1,442	0	1,442	1,658	707	79.4%
Feb	28	638	22.8	13%	0	638	1,303	0	1,303	1,497	638	79.4%
Mar	31	707	22.8	15%	0	707	1,442	0	1,442	1,658	707	79.4%
Apr	30				0	0	0	0	0	0	0	-
May	31				0	0	0	0	0	0	0	-
Jun	30				0	0	0	0	0	0	0	-
Jul	31				0	0	0	0	0	0	0	-
Aug	31				0	0	0	0	0	0	0	-
Sep	30				0	0	0	0	0	0	0	-
Oct	31				0	0	0	0	0	0	0	-
Nov	30	684	22.8	17%	0	684	1,396	0	1,396	1,604	684	79.4%
Dec	31	707	22.8	12%	0	707	1,442	0	1,442	1,658	707	79.4%
Total:	365	3,443		12.3%	0	3,443	7,025	0	7,025	8,074	3,443	79%

		Fuel Usage With CHP			Electric Savings With CHP			
Month	Days	Supplemental Boiler Gas Therms	Cogen Gas Therms	Total Gas	Run Hours	Avg Cogen Plant kW Output	kW Demand Savings	Cogen Electric Generation kWh
Jan	31	11,575	2,878	15,923	707	35	35	24,738
Feb	28	10,384	2,599	14,303	638	35	35	22,344
Mar	31	9,593	2,878	13,721	707	35	35	24,738
Apr	30	0	0	7,613	0	0	0	0
May	31	0	0	1,358	0	0	0	0
Jun	30	0	0	561	0	0	0	0
Jul	31	0	0	389	0	0	0	0
Aug	31	0	0	396	0	0	0	0
Sep	30	0	0	547	0	0	0	0
Oct	31	5,558	0	6,175	0	0	0	0
Nov	30	7,653	2,785	11,466	684	35	35	23,940
Dec	31	12,710	2,878	17,184	707	35	35	24,738
Total:	365	57,474	14,017	89,639	3,443		35	120,498

Runtime Analysis	
Run hours	3,443
Full load heat and electric hours	3,443
% Boiler load displaced by CHP	12%

Combined Heat & Power Emission Reduction										
BUILDING	kW	Equivalent Full Load Electric Hours	NET GENERATION MWh	FUEL INPUT MMBTU	ELECTRIC SAVINGS FROM HEAT RECOVERY MWh	FOSSIL FUEL SAVINGS FROM HEAT RECOVERY MMBTU	CO2 EF ELECTRIC	CO2 EF CHP	CO2 EF GAS	CO2 EMISSION REDUCTION LBS
John P. Stevens High Schoo	35	3,443	120.5	1,401.7	0	807.4	1,292.0	1,361.0	117.0	86,152.7

Combined Heat & Power Emission Reduction									
BUILDING	NOx EF ELECTRIC	NOx EF CHP	NOx EF GAS	NOx EMISSION REDUCTION LBS	SO2 EF ELECTRIC	SO2 EF CHP	SO2 EMISSION REDUCTION LBS	Hg EF ELECTRIC	Hg EMISSION REDUCTION LBS
John P. Stevens High School	0.83	1.07	0.092	45.3	0.67	0.00	80.7	0.67	0.00

The NJ Protocol is to follow the National Renewable Energy Laboratory's Combined Heat and Power, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures [1]. The product should be all of the below outputs, as applicable:

a. Annual energy input to the generator, HHV basis (MMBtu/yr)
b. Annual electricity generated, net of all parasitic loads (kWh/yr)
c. Annual fossil fuel energy savings from heat recovery (MMBtu/yr)
d. Annual electric energy savings from heat recovery, including absorption chiller sourced savings if chiller installation is included as part of the system installation (kWh/yr)
e. Annual overall CHP fuel conversion efficiency, HHV basis (%)
f. Annual electric conversion efficiency, net of parasitics, HHV basis (%)

CHP Emissions Reduction Associated with PJM Grid

(Assuming that the useful thermal output will displace natural gas)

Algorithms

CO_2 ER (lbs) = (CO_2 EF_{elec} – CO_2 EF_{CHP}) * Net Electricity Generation (MWh) + CO_2 EF_{elec} * Electric Energy Savings (MWh) + CO_2 EF_{NG} * Gas Energy Savings (MMBtu) * 10

NO_x ER (tons) = (NO_x EF_{elec} – NO_x EF_{CHP}) * Net Electricity Generation (MWh) + NO_x EF_{elec} * Electric Energy Savings (MWh) + NO_x EF_{NG} * Gas Energy Savings (MMBtu) * 10

SO_2 ER (lbs) = (SO_2 EF_{elec} – SO_2 EF_{CHP}) * Net Electricity Generation (MWh) + SO_2 EF_{elec} * Electric Energy Savings (MWh)

Hg (grams) = (Electric Energy Savings (MWh) * Hg EF_{elec})/1,000

Definition of Variables

CO_2 EF_{elec} = CO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{elec} = NO_x Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

SO_2 EF_{elec} = SO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

Hg EF_{elec} = Hg Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

CO_2 EF_{CHP} = CO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

NO_x EF_{CHP} = NO_x Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

SO_2 EF_{CHP} = SO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

CO_2 EF_{NG} = CO_2 Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{NG} = NO_x Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

10 = Conversion from MMBtu to therms (1 MMBtu = 10 therms)

Calculation of Clean Air Impacts

The amount of air emission reductions resulting from the energy savings is calculated using the energy savings at the system level and multiplying them by factors provided by the New Jersey Department of Environmental Protection, Office of Air and Energy Advisor, on June 25, 2019.

Using Weighted Average of 2018 PJM On-Peak and Off-Peak annual data:

Electric Emission Factors

Emissions Product	Pounds per MWh[7]
CO_2	1,292
NOx	0.83
SO_2	0.67
Hg	1.1 mg/MWh[8]

Natural Gas Emission Factors

Emissions Product	Current
CO_2	11.7 lbs per therm saved
NOx	0.0092 lbs per therm saved

Note: CHP emission factors for CO2 and NOx were calculated using nameplate electric generation and natural gas input capacity as seen in the ECM calculation. Per BPU Protocols, natural gas does not require SO2 or Hg emission factors.

ECM 16 – eTemp Refrigeration Sensors

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
16	eTemp Refrigeration Sensor	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔				

Commercial refrigerators waste 20% of their energy and run 50% or more cycles than necessary trying to keep temperature constant. This is because air temperature is measured instead of food temperature. The eTemp technology is NSF certified to accurately simulate product temperature and automatically relays the information to the existing thermostat. eTemp is a mechanical device that is placed over the thermostat inside of the of the walk-in unit. It dampens the temperature control to more accurately reflect the temperature of the food versus the temperature of the air. This device also reduces compressor cycling which will save energy and extend equipment life.

Existing Conditions

Existing Freezers at Edison HS and Herbert Hoover MS

Existing Conditions at Woodrow Wilson and Joh P. Stevens HS

Existing Conditions at James Monroe Elementary School and Woodbrook ES

Scope of Work

eTEMP Scope of Work			
BUILDING	**SQFT**	**CATEGORY**	**QUANTITY**
Edison High School	250,499	eTemp	16
John P. Stevens High School	220,287	eTemp	17
Herbert Hoover Middle School	132,625	eTemp	9
John Adams Middle School	93,041	eTemp	8
Thomas Jefferson Middle School	90,514	eTemp	6
Woodrow Wilson Middle School	102,122	eTemp	5
Benjamin Franklin Elementary School	56,975	eTemp	2
James Madison Intermediate School	44,000	eTemp	2
James Madison Primary School	46,000	eTemp	1
James Monroe Elementary School	67,800	eTemp	5
John Marshall Elementary School	62,517	eTemp	2
Lincoln Elementary School	55,315	eTemp	1
Lindeneau Elementary School	45,503	eTemp	2
Martin Luther King Elementary School	54,136	eTemp	3
Washington Elementary School	56,410	eTemp	2
Woodbrook Elementary School	85,954	eTemp	7

ECM Calculations

Baseline energy use and percent energy savings are based upon historical values provided by vendor.

eTEMP Savings									
BUILDING NAME	Type	Est Qty of Devices	Baseline Energy Use (kWh)	Revised Baseline Energy Use (kWh)	%Energy Reduction	Savings per Unit (kWh)	Total Baseline Energy Consumption (kWh)	Energy Savings (kWh)	Total Energy Savings (kWh)
Edison High School	Walk-in Cooler	2	21,000	21,000	23.0%	4,830	42,000	9,660	40,365
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
	Reach-in Cooler - 1 door	7	7,500	7,500	23.0%	1,725	52,500	12,075	
	Reach-in Cooler - 2 door	5	9,000	9,000	23.0%	2,070	45,000	10,350	
	Reach-in Cooler - 3 door	1	11,000	11,000	23.0%	2,530	11,000	2,530	
John P. Stevens High School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	44,160
	Walk-in Freezer	2	25,000	25,000	23.0%	5,750	50,000	11,500	
	Reach-in Cooler - 1 door	6	7,500	7,500	23.0%	1,725	45,000	10,350	
	Reach-in Cooler - 2 door	6	9,000	9,000	23.0%	2,070	54,000	12,420	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	1	10,000	10,000	23.0%	2,300	10,000	2,300	
	Reach-in Freezer - 2 door	1	12,000	12,000	23.0%	2,760	12,000	2,760	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
Herbert Hoover Middle School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	18,860
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	2	7,500	7,500	23.0%	1,725	15,000	3,450	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	1	11,000	11,000	23.0%	2,530	11,000	2,530	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	1	12,000	12,000	23.0%	2,760	12,000	2,760	
	Reach-in Freezer - 3 door	1	14,000	14,000	23.0%	3,220	14,000	3,220	
John Adams Middle School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	11,385
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	1	12,000	12,000	23.0%	2,760	12,000	2,760	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
Thomas Jefferson Middle School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	10,580
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
Woodrow Wilson Middle School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	16,905
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	1	11,000	11,000	23.0%	2,530	11,000	2,530	
Benjamin Franklin Elementary School	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	3,795
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	0	12,000	12,000	23.0%	2,760	0	0	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
James Madison Intermediate School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	3,795
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	0	12,000	12,000	23.0%	2,760	0	0	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	

eTEMP Savings									
BUILDING NAME	Type	Est Qty of Devices	Baseline Energy Use (kWh)	Revised Baseline Energy Use (kWh)	% Energy Reduction	Savings per Unit (kWh)	Total Baseline Energy Consumption (kWh)	Energy Savings (kWh)	Total Energy Savings (kWh)
James Madison Primary School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	2,070
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	0	7,500	7,500	23.0%	1,725	0	0	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	0	12,000	12,000	23.0%	2,760	0	0	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
James Monroe Elementary School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	16,790
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
	Reach-in Cooler - 1 door	0	7,500	7,500	23.0%	1,725	0	0	
	Reach-in Cooler - 2 door	3	9,000	9,000	23.0%	2,070	27,000	6,210	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	0	12,000	12,000	23.0%	2,760	0	0	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
John Marshall Elementary School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	10,580
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
Lincoln Elementary School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	1,725
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
Lindeneau Elementary School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	4,140
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	0	7,500	7,500	23.0%	1,725	0	0	
	Reach-in Cooler - 2 door	2	9,000	9,000	23.0%	2,070	18,000	4,140	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	0	12,000	12,000	23.0%	2,760	0	0	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	
Martin Luther King Elementary School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	5,520
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	2	7,500	7,500	23.0%	1,725	15,000	3,450	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
Washington Elementary School	Walk-in Cooler	0	21,000	21,000	23.0%	4,830	0	0	3,795
	Walk-in Freezer	0	25,000	25,000	23.0%	5,750	0	0	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
Woodbrook Elementary School	Walk-in Cooler	1	21,000	21,000	23.0%	4,830	21,000	4,830	17,135
	Walk-in Freezer	1	25,000	25,000	23.0%	5,750	25,000	5,750	
	Reach-in Cooler - 1 door	1	7,500	7,500	23.0%	1,725	7,500	1,725	
	Reach-in Cooler - 2 door	1	9,000	9,000	23.0%	2,070	9,000	2,070	
	Reach-in Cooler - 3 door	0	11,000	11,000	23.0%	2,530	0	0	
	Reach-in Freezer - 1 door	0	10,000	10,000	23.0%	2,300	0	0	
	Reach-in Freezer - 2 door	1	12,000	12,000	23.0%	2,760	12,000	2,760	
	Reach-in Freezer - 3 door	0	14,000	14,000	23.0%	3,220	0	0	

ECM 17 – Roof Upgrades

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
17	Roof Upgrades	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	

Spray Polyurethane Foam Roof Restoration

Spray polyurethane foam (commonly referred to as SPF) is a spray-applied rigid, insulating cellular plastic that is applied as a liquid, immediately expanding to 30 times its original volume. The resulting high density roofing foam is resistant to foot traffic and water. Spray polyurethane foam is the fastest growing insulating product in the world. As a roofing material it provides many benefits over traditional roofing materials. Exceptional durability, unmatched R-value, air barrier properties and a multitude of additional benefits make it a truly versatile roofing system. Spray Foam Roofing System is suitable for both new roofing and reroof applications.

Spray polyurethane foam Roof Restoration

Performance

Watertight: Because our systems are manufactured in place, major weaknesses, including
seams and mechanical fasteners, are eliminated.

Durable: Resistant to damage from pedestrian traffic and storm damage.

UV Resistant: Unlike traditional roofing systems, this system has a surface designed for even the harshest UV conditions.

Seamless: Because our systems are manufactured in place, seams, the major weakness of most membrane systems, are eliminated.

Light Weight: Very low impact on the overall roof weight load.
Fully Adhered: Contributes to excellent wind uplift performance.
Breathable: Trapped moisture in the existing roof system will pass through the membrane.
Highly Heat Reflective: Dramatically improves occupants' comfort by typically cutting a summer roof surface temperature by 50-90˚
Reduces Movement: Insulation and reflective properties significantly reduce building stresses due to thermal expansion and contraction.
Disruption Free: Installation is completed without bothering building occupants.
Extends Building Life: Cool roof surface will reduce expansion and contraction stresses on the building.

Value

Very High R-value: R value of over 6.0 per inch. Effective insulation at high and low temperatures.
Energy Savings: SPF insulates, blocks radiant heat while topcoat is highly reflective.
No Tear Off: For reroofing applications, typically no costly tear off required.
No Fasteners or Seams: No problems with fastener shorts and gaps in insulation, leaking energy.
Air Barrier: Many membrane roofs act as bellows by actually pumping out conditioned air and bring in outside air.
Low Life Cycle Cost: Simply maintaining the protective surface coating on the roof every 10-15 years, your roof will last indefinitely.

Environment

No Tear Off: Typically, no need to remove roof and fill our landfills with roof waste.
Environmentally Friendly: Non -hazardous, non- flammable and easy cleanup.
Low VOC: Meets the most stringent VOC requirements in the U.S.
Low Odor: Can be installed in situations where rooftop air handlers cannot be turned off.
Sustainable: Simply maintaining the protective surface coating on your roof every 10-15 years, the roof will last indefinitely.

Scope of Work

The current scope of work has solar and roof upgrades for the following schools:
See Appendix G for Existing Roof layouts

Roof Refurbishment Scope of Work						
BUILDING	Area	Include? (Y/N)	NEW SOLAR?	Existing Roof	Proposed Roof	QUANTITY (SF)
Edison High School	A	N	Y	2021 SR Products roof	2021 SR Products roof	6,500
Edison High School	B	Y	Y	2023 SR Products roof	2023 SR Products roof	24,750
Edison High School	C	N	N	BUR w/ gravel	Requires complete tear-off replacement	18,250
Edison High School	D	Y	Y	Mod Bit	SPF w/ 3% allowance for wet insulation	8,300
Edison High School	D1	N	N	2021 Modified Bitumen	2021 Modified Bitumen	9,400
Edison High School	E	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	11,000
Edison High School	F	N	Y	2020 SPF roof	2020 SPF roof	12,250
Edison High School	F1	N	N	2020 SPF roof	2020 SPF roof	4,500
Edison High School	G	N	Y	2021 SR Products roof	2021 SR Products roof	11,600
Edison High School	H	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	13,500
Edison High School	I	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	36,000
Edison High School	J	Y	Y	Mod Bit	SPF w/ 3% allowance for wet insulation	30,000
Edison High School	K	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,000
Edison High School	L	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	2,500
John P. Stevens High School	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	47,750
John P. Stevens High School	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	7,250
John P. Stevens High School	A1	Y	Y	2023 SR Products roof	2023 SR Products roof	5,000
John P. Stevens High School	B	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	16,000
John P. Stevens High School	B1	Y	Y	2023 SR Products roof	2023 SR Products roof	7,000
John P. Stevens High School	B2	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	16,000
John P. Stevens High School	C	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	12,800
John P. Stevens High School	D	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	19,000
John P. Stevens High School	E	Y	Y	2023 SR Products roof	2023 SR Products roof	5,500
John P. Stevens High School	F	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,700
John P. Stevens High School	G	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	47,600
John P. Stevens High School	H	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	14,700
John P. Stevens High School	I	Y	N	2023 SR Products roof	2023 SR Products roof	2,500
Herbert Hoover Middle School	A	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	3,000
Herbert Hoover Middle School	B	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	40,000
Herbert Hoover Middle School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	25,000
Herbert Hoover Middle School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	5,000
John Adams Middle School	A	N	N	2020 SPF roof	2020 SPF roof	11,800
John Adams Middle School	B	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	13,000
John Adams Middle School	C	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	20,000
John Adams Middle School	D	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	23,000
John Adams Middle School	E	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	6,400
John Adams Middle School	F	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	10,800
John Adams Middle School	G	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	7,500
Thomas Jefferson Middle School	A	Y	Y	2022 SPF roof	2022 SPF roof	14,400
Thomas Jefferson Middle School	A1	Y	Y	2022 SPF roof	2022 SPF roof	14,400
Thomas Jefferson Middle School	B	Y	Y	2022 SPF roof	2022 SPF roof	10,000
Thomas Jefferson Middle School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	6,250
Thomas Jefferson Middle School	D	Y	Y	2022 SPF roof	2022 SPF roof	14,400
Thomas Jefferson Middle School	E	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	8,500

Roof Refurbishment Scope of Work

BUILDING	Area	Include? (Y/N)	NEW SOLAR?	Existing Roof	Proposed Roof	QUANTITY (SF)
Woodrow Wilson Middle School	A	N	N	2020 SPF roof	2020 SPF roof	9,500
Woodrow Wilson Middle School	B	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	19,400
Woodrow Wilson Middle School	C	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	26,100
Benjamin Franklin Elementary School	A	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	30,000
Benjamin Franklin Elementary School	B	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	7,300
Benjamin Franklin Elementary School	C	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	6,500
Benjamin Franklin Elementary School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	3,600
Benjamin Franklin Elementary School	E	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,800
James Madison Intermediate School	A	N	Y	2020 SPF roof	2020 SPF roof	15,625
James Madison Intermediate School	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,995
James Madison Intermediate School	B	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	14,950
James Madison Primary School	A	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	20,000
James Madison Primary School	B	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	30,000
James Madison Primary School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,000
James Monroe Elementary School	A	N	Y	2017 Modified Bitumen	2017 Modified Bitumen	40,000
James Monroe Elementary School	B	N	Y	2017 Modified Bitumen	2017 Modified Bitumen	4,000
James Monroe Elementary School	C	N	Y	2017 Modified Bitumen	2017 Modified Bitumen	2,700
John Marshall Elementary School	A	Y	Y	Mod Bit	SPF w/ 3% allowance for wet insulation	10,500
John Marshall Elementary School	B	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	3,600
John Marshall Elementary School	C	N	Y	Metal	N/A	11,650
John Marshall Elementary School	D	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	22,000
John Marshall Elementary School	E	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	6,300
Lincoln Elementary School	A	N	N	BUR w/ gravel	Replace (2 existing roofs)	22,500
Lincoln Elementary School	B	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	10,100
Lincoln Elementary School	C	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	18,600
Lindeneau Elementary School	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	38,600
Lindeneau Elementary School	B	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	9,000
Lindeneau Elementary School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	1,200
Lindeneau Elementary School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	2,000
Martin Luther King Elementary School	A	N	Y	2020 SPF roof	2020 SPF roof	18,850
Martin Luther King Elementary School	A	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	5,150
Martin Luther King Elementary School	B	N	N	2020 SPF roof	2020 SPF roof	8,000
Martin Luther King Elementary School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	12,950
Martin Luther King Elementary School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	14,500
Washington Elementary School	A	N	Y	2019 SPF roof	2019 SPF roof	19,300
Washington Elementary School	B	Y	Y	2022 SPF roof	2022 SPF roof	13,600
Washington Elementary School	C	N	N	BUR w/ gravel	Replace (2 existing roofs)	18,150
Washington Elementary School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	7,500
Washington Elementary School	E	N	N	Shingle		2,750
Woodbrook Elementary School	A	Y	Y	BUR w/ gravel	New roof, age unknown	16,900
Woodbrook Elementary School	B	N	Y	2020 SPF roof	2020 SPF roof	35,000
Woodbrook Elementary School	C	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	8,885
Woodbrook Elementary School	D	N	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	6,000
FDR Round Building	A	Y	N	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	14,600
Edison Early Learning Center	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	7,300
Edison Education Center	A	Y	Y	BUR w/ gravel	SPF w/ 3% allowance for wet insulation	43,000
Building and Grounds	A	N	Y	Metal		30,000

ECM Calculations

Roof - Heating Savings											
BUILDING	ROOF SQFT	HEATING EFFICIENCY (%)	HOURS (HR/DAY)	HEATING DEGREE DAYS (°F-days)	EXISTING R-VALUE (ft2-°F-h/BTU)	EXISTING U-VALUE (BTU/ft2-°F-h)	PROPOSED R-VALUE (ft2-°F-h/BTU)	PROPOSED U-VALUE (BTU/ft2-°F-h)	EXISTING HEAT LOSS (THERM)	POST-RETRO FIT HEAT LOSS (THERM)	ROOF SAVINGS (THERM)
Edison High School	87,550	76.0%	24.00	4615	20	0.0500	26	0.0385	6379	4907	1,472
John P. Stevens High School	194,800	87.0%	24.00	4615	20	0.0500	26	0.0385	12400	9538	2,862
Herbert Hoover Middle School	40,000	81.6%	24.00	4615	20	0.0500	26	0.0385	2715	2089	627
John Adams Middle School	43,000	76.2%	24.00	4615	20	0.0500	26	0.0385	3126	2404	721
Thomas Jefferson Middle School	53,200	76.2%	24.00	4615	20	0.0500	26	0.0385	3867	2975	892
Woodrow Wilson Middle School	45,500	79.6%	24.00	4615	20	0.0500	26	0.0385	3167	2436	731
Benjamin Franklin Elementary School	23,600	79.3%	24.00	4615	20	0.0500	26	0.0385	1647	1267	380
James Madison Intermediate School	24,945	78.6%	24.00	4615	20	0.0500	26	0.0385	1758	1352	406
James Madison Primary School	30,000	86.1%	24.00	4615	20	0.0500	26	0.0385	1929	1484	445
John Marshall Elementary School	32,500	75.1%	24.00	4615	20	0.0500	26	0.0385	2395	1843	553
Lincoln Elementary School	18,600	75.2%	24.00	4615	20	0.0500	26	0.0385	1370	1054	316
Lindeneau Elementary School	38,600	84.5%	24.00	4615	20	0.0500	26	0.0385	2529	1945	584
Washington Elementary School	13,600	83.5%	24.00	4615	20	0.0500	26	0.0385	902	694	208
Woodbrook Elementary School	16,900	80.7%	24.00	4615	20	0.0500	26	0.0385	1160	892	268
FDR Round Building	14,600		24.00	4615	20	0.0500	26	0.0385			
Edison Early Learning Center	7,300	77.1%	24.00	4615	20	0.0500	26	0.0385	524	403	121
Edison Education Center	43,000	80.0%	24.00	4615	20	0.0500	26	0.0385	2977	2290	687

Roof - Cooling Savings												
BUILDING	ROOF SQFT	EFFICIENCY (EER)	EFFICIENCY (kWh/ton-hr)	HOURS (HR/DAY)	COOLING HOURS (CDD)	EXISTING R-VALUE (ft2-°F-h/BTU)	EXISTING U-VALUE (BTU/ft2-°F-h)	PROPOSED R-VALUE (ft2-°F-h/BTU)	PROPOSED U-VALUE (BTU/ft2-°F-h)	PRE-RETRO FIT COOLING LOSS (kWh)	POST-RETRO FIT COOLING LOSS (kWh)	ROOF SAVINGS (kWh)
Edison High School	87,550	9.2	1.304	24.00	954	20	0.0500	26	0.0385	10891	8378	2,513
John P. Stevens High School	194,800	9.5	1.266	24.00	954	20	0.0500	26	0.0385	23520	18092	5,428
Herbert Hoover Middle School	40,000	9.1	1.316	24.00	954	20	0.0500	26	0.0385	5020	3862	1,158
John Adams Middle School	43,000	10.5	1.143	24.00	954	20	0.0500	26	0.0385	4690	3607	1,082
Thomas Jefferson Middle School	53,200	9.3	1.297	24.00	954	20	0.0500	26	0.0385	6581	5062	1,519
Woodrow Wilson Middle School	45,500	8.7	1.373	24.00	954	20	0.0500	26	0.0385	5959	4584	1,375
Benjamin Franklin Elementary School	23,600	9.2	1.301	24.00	954	20	0.0500	26	0.0385	2928	2252	676
James Madison Intermediate School	24,945	9.5	1.261	24.00	954	20	0.0500	26	0.0385	3000	2308	692
James Madison Primary School	30,000	9.2	1.297	24.00	954	20	0.0500	26	0.0385	3713	2856	857
John Marshall Elementary School	32,500	10.2	1.177	24.00	954	20	0.0500	26	0.0385	3649	2807	842
Lincoln Elementary School	18,600	9.5	1.257	24.00	954	20	0.0500	26	0.0385	2231	1716	515
Lindeneau Elementary School	38,600	9.2	1.300	24.00	954	20	0.0500	26	0.0385	4787	3682	1,105
Washington Elementary School	13,600	9.6	1.246	24.00	954	20	0.0500	26	0.0385	1616	1243	373
Woodbrook Elementary School	16,900	9.9	1.216	24.00	954	20	0.0500	26	0.0385	1961	1508	453
FDR Round Building	14,600	9.8	1.228	24.00	954	20	0.0500	26	0.0385	1710	1315	395
Edison Early Learning Center	7,300	9.5	1.261	24.00	954	20	0.0500	26	0.0385	878	676	203
Edison Education Center	43,000	10.0	1.195	24.00	954	20	0.0500	26	0.0385	4902	3771	1,131

Roof Savings (therm) = Existing Heat Loss (therm) - Proposed Heat Loss (therm)

Existing Heat Loss (therm) = (Existing U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Proposed Heat Loss (therm) = (Proposed U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Roof Savings (kWh) = Existing Cooling Loss (kWh) - Proposed Cooling Loss (kWh)

Existing Cooling Loss (kWh) = (Existing U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

Proposed Cooling Loss (kWh) = (Proposed U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

ECM 18 – Retro-commissioning

EDISON TWP PUBLIC SCHOOLS

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
18	Retrocommissioning	✔	✔								✔										

Scope of Work

Due to the complexity of today's HVAC systems and controls, it is likely for systems to be operating incorrectly or not as efficiently as they could be. Retro-commissioning studies reveal hidden deficiencies and highlights operational & maintenance (O&M) issues that could have been avoided as well as exposes hidden control system problems. There are valuable benefits to retro-commissioning in existing buildings. It is a detailed and specialized process that reviews how an HVAC system is controlled and designed to operate. Applying retro-commissioning to existing facilities includes planning, discovering root causes of inefficiencies, development of a cost-effective project delivery and a focus on optimizing value to the building owner. The study includes functional system testing under various modes, such as heating or cooling loads, occupied and unoccupied modes, varying outside air temperature and space temperatures.

This is a systematic process to ensure that the building energy systems perform interactively according to the original design intent and the current operational needs of the facility. Retro-commissioning is a common practice recommended by the American Society of Heating Refrigeration and Energy (ASHRAE) to be revisited every couple of years. We recommend that an engineering firm who specializes in energy control systems and retro-commissioning be contacted for a detailed evaluation and implementation costs. Facility operations personnel would work with the engineers to develop goals and objectives. During on-site testing, the qualified personnel conducting the study would immediately make any no/low cost improvements as identified. Furthermore, any suggested corrective actions which require the

purchase of material, a contractor who specializes in that scope of work would be contacted to implement the remaining improvements.

Energy Savings Calculations

According to a Lawrence Berkeley National Laboratory study, *The Cost-Effectiveness of Commercial Buildings Commissioning*, "For existing buildings, we found median commissioning costs of $0.27/ft2, whole-building energy savings of 15 percent, and payback times of 0.7 years." Savings are conservatively estimated to be 5% of post ESIP site electric and natural gas use:

Retro-Commissioning Savings							
BUILDING	SQFT	POST ESIP SITE kWh	% ELECTRIC SAVINGS	kWh SAVINGS	POST ESIP SITE THERMS	% THERM SAVINGS	THERMS SAVINGS
Edison High School	250,499	1,099,103	5%	54,955	133,731	5%	6,687
John P. Stevens High School	220,287	1,264,663	5%	63,233	98,989	5%	4,949
James Monroe Elementary School	67,800	454,285	5%	22,714	18,028	5%	901

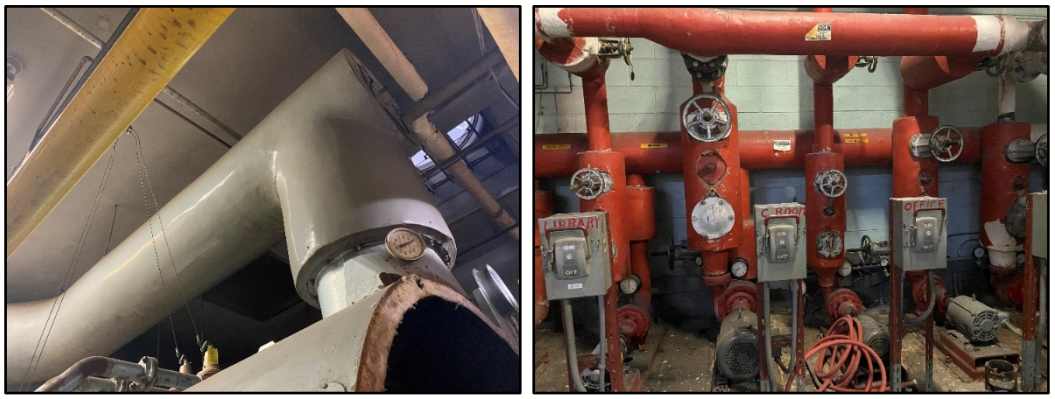
Capital Improvement 19 – Asbestos Abatement

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
19 Asbestos Abatement		✔													✔					

Scope of Work

Asbestos abatement has been included given the age of John P. Stevens High School and Washington Elementary School boiler rooms. The following locations have been identified for asbestos abatement according to previous site testing:

- Boiler
- Flue
- Pumps
- Piping



J.P. Stevens HS boiler plant ACM

Energy Savings Calculations

There are no energy savings associated with this measure.

ECM 20 – Exhaust Fan Replacement

EDISON TWP PUBLIC SCHOOLS	Edison High School	John P. Stevens High School	Herbert Hoover Middle School	John Adams Middle School	Thomas Jefferson Middle School	Woodrow Wilson Middle School	Benjamin Franklin Elementary School	James Madison Intermediate School	James Madison Primary School	James Monroe Elementary School	John Marshall Elementary School	Lincoln Elementary School	Lindeneau Elementary School	Martin Luther King Elementary School	Washington Elementary School	Woodbrook Elementary School	FDR Round Building	Edison Early Learning Center	Edison Education Center	Building and Grounds
✔ ECM evaluated but not included																				
✔ ECM included in the project																				
ECM # / **ECM DESCRIPTION**																				
20 Exhaust Fan Replacement	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔		

Exhaust fans are required for air balancing within commercial buildings and improve overall HVAC air distribution and system performance. Exhaust fans electric motors will help reduce a buildings electrical usage and be more efficient tied into a buildings energy management system. Exhaust fan motors efficiencies have been increasing recently to blow the same amount airflow with less electricity. Premium efficiency motors can be as high as 95% efficient (as opposed to standard efficiency motors of 78% to 88%). Exhaust fans can also be tied into a buildings energy management system. This allows the users to set schedules and turn the fans on only when necessary.

Existing Conditions

Existing exhaust fans at Benjamin Franklin ES and Edison HS

Existing exhaust fans at John P. Stevens HS and Thomas Jefferson MS

Scope of Work

Exhaust Fan Estimate				
BUILDING	**SQFT**	**SYSTEM**	**Fan QTY**	**EXISTING FAN HP**
Edison High School	250,499	Exhaust Fans	18	0.3
John P. Stevens High School	220,287	Exhaust Fans - A	4	0.5
			3	0.2
			3	1.5
			1	0.1
			6	0.3
			1	0.8
			2	1.0
Herbert Hoover Middle School	132,625	Exhaust Fans	2	0.8
			4	1.0
			2	0.3
John Adams Middle School	93,041	Exhaust Fans	11	0.3
			1	1.0
Thomas Jefferson Middle School	90,514	Exhaust Fans	18	0.3
			1	0.8
Woodrow Wilson Middle School	102,122	Exhaust Fans	24	0.1
			1	1.0
Benjamin Franklin Elementary School	56,975	Exhaust Fans	14	0.75
		Exhuast Fans	10	0.25
James Madison Intermediate School	44,000	Exhaust Fans	24	0.1
James Madison Primary School	46,000	Exhaust Fans	7	0.5
			5	0.3
			1	0.8
			2	1.0
			5	0.2
			2	0.1
James Monroe Elementary School	67,800			
John Marshall Elementary School	62,517	Exhaust Fans	8	0.3
			3	0.1
			4	0.8
			1	2.0
Lincoln Elementary School	55,315	Exhaust Fans	14	0.1
Lindeneau Elementary School	45,503	Exhaust Fans	2	1.0
Martin Luther King Elementary School	54,136	Exhaust Fans	7	0.2
Washington Elementary School	56,410	Exhaust Fans	28	0.3
Woodbrook Elementary School	85,954	Exhaust Fans	1	0.8
			7	0.3
			1	0.5
			8	1.0
			1	0.1
FDR Round Building	14,750	Exhaust Fans	4	0.3
Edison Early Learning Center	7,297	Exhaust Fans	10	0.2

ECM Calculations

Exhaust Fan savings were calculated using BPU Protocols.

Exhaust Fan Savings

BUILDING	SQFT	SYSTEM	Areas Served	Fan QTY	EXISTING FAN HP	PROPOSED FAN HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)	LF	CF	IFvfd	HRS
Benjamin Franklin Elementary School	56,975	EF 1	Corridor near CR 117-120	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 2	Restroom near CR 121	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 3	Corridor near CR 121-123	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 4	Corridor near CR 124-126	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 5	Restroom near Teacher's Lounge	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 6	Teacher's Lounge	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 7	Restroom in Main Office	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 8	Restroom in Main Office	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 9	Restroom in Nurse's Office	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 10	Restroom in Kindergarten CR 103/104	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 11	Corridor near CR 102	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 12	Restroom near CR 102	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 13	Corridor near CR 101	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 14	Corridor near Library	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 15	Corridor near Multi-Purpose Rm	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 16	Corridor near Multi-Purpose Rm	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 17	Kitchen	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 18	Multi-Purpose Rm Storage	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 19	Corridor near CR 110	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 20	Corridor near CR 114	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 21	Corridor near CR 106	1	0.75	0.75	75.3%	85.5%	0.75	0.74	0.9	3,274
		EF 22	Corridor near Art Rm	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 23	Restroom near CR 113	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274
		EF 24	Restroom near CR 107	1	0.25	0.25	66.9%	85.5%	0.75	0.74	0.9	3,274

Exhaust Fan Savings

BUILDING	ΔkW	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)	TOTAL ELECTRIC SAVINGS (kWh)
Benjamin Franklin Elementary School	0.08	0.06	196	894	0.297	0.2	671	0.3	866	15,705
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.08	0.06	196	894	0.297	0.2	671	0.3	866	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	
	0.05	0.04	134	894	0.297	0.1	224	0.1	358	

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
LF	Fixed	0.75	1
η_{base}	Fixed	ASHRAE 90.1-2016 Baseline Efficiency Table	ASHRAE
η_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

ENERGY CONSERVATION STANDARDS

§ 431.446 Small electric motors energy conservation standards and their effective dates.

(a) Each small electric motor manufactured (alone or as a component of another piece of non-covered equipment) after March 9, 2015, or in the case of a small electric motor which requires listing or certification by a nationally recognized safety testing laboratory, after March 9, 2017, shall have an average full load efficiency of not less than the following:

Expand Table

Motor horsepower/standard kilowatt equivalent	Average full load efficiency		
	Polyphase		
	Open motors (number of poles)		
	6	4	2
0.25/0.18	67.5	69.5	65.6
0.33/0.25	71.4	73.4	69.5
0.5/0.37	75.3	78.2	73.4
0.75/0.55	81.7	81.1	76.8
1/0.75	82.5	83.5	77.0
1.5/1.1	83.8	86.5	84.0
2/1.5	N/A	86.5	85.5
3/2.2	N/A	86.9	85.5

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I
(Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables
ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application
HP = Nameplate motor horsepower or manufacturer specification sheet per application
ESF = Energy Savings Factor (kWh/year per HP)
DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
DSF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3

The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 4 – FINANCIAL ANALYSIS

Form V – ESCO Construction and Service Fees

FORM V		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM EDISON TWP PUBLIC SCHOOLS ENERGY SAVING IMPROVEMENT PROGRAM		
ESCO Name: DCO Energy PROPOSED CONSTRUCTION FEES:		
Fee Category	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
Estimated Value of Hard Costs [2]	$ 19,942,863	N/A
ECM Contingency	$ 997,143	
Total Value of Hard Costs	$ 20,940,006	
Project Service Fees		
Investment Grade Energy Audit	$ 314,100	1.50%
Design Engineering Fees	$ 1,047,000	5.00%
Construction Management & Project Administration	$ 1,308,750	6.25%
System Commissioning	$ 104,700	0.50%
Equipment Initial Training Fees	$ 157,050	0.75%
ESCO Overhead	$ 628,200	3.00%
ESCO Profit	$ 837,600	4.00%
Project Service Fees Sub Total	$ 2,931,601	14.00%
TOTAL FINANCED PROJECT COSTS:	$ 25,337,408	21.00%
PROPOSED ANNUAL SERVICE FEES		
First Year Annual Service Fees	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
SAVINGS GUARANTEE *(OPTION)*	$0	0.00%
Measurement & Verification *(Associated w/ Savings Guarantee Option)*	$167,520	0.80%
ENERGY STAR Services *(optional)*	$0	0.00%
Post Construction Services *(if applicable)*	$0	0.00%
Performance Monitoring	w/ M&V	0.00%
On-going Training Services	w/ M&V	0.00%
Verification Reports	w/ M&V	0.00%
TOTAL FIRST YEAR ANNUAL SERVICES	$167,520	0.80%

Form VI – Project Cash Flow Analysis

FORM VI

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
EDISON TWP BOE - ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

Note: Respondents must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at **2.4% gas, 2.2%** electric per year and
1. Term of Agreement: **18** Years
2. Construction Period [2] (months): 24 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$50,550
DMR Associates	$1,047,000
Total	$1,097,550

Project Cost[1]: **$25,337,408**
Miscellaneous Costs Financed: **$1,097,550**
Financed Amount: **$26,434,958**

Interest Rate: **4.00%**

Year	Annual Energy Savings	Solar Savings	Annual Operational Savings	Energy Rebates / Incentives	Total Annual Savings	Annual Project Costs	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ 1,304,429	$ 840,558	$ -		$ 2,144,987		$ -	$ -
Year 1	$ 922,713	$ 855,135	$ 82,724	$325,747	$ 2,186,320	$ (4,328,633)	$ 2,675	$ 2,675
Year 2	$ 942,642	$ 869,964	$ 82,724		$ 1,895,331	$ (1,892,656)	$ 2,675	$ 5,350
Year 3	$ 963,022	$ 885,050	$ 50,630		$ 1,898,702	$ (1,896,027)	$ 2,675	$ 8,025
Year 4	$ 983,864	$ 900,396	$ 50,630		$ 1,934,890	$ (1,932,215)	$ 2,675	$ 10,700
Year 5	$ 1,005,179	$ 916,007	$ 50,630		$ 1,971,816	$ (1,969,141)	$ 2,675	$ 13,374
Year 6	$ 1,026,978	$ 931,888			$ 1,958,865	$ (1,956,190)	$ 2,675	$ 16,049
Year 7	$ 1,049,270	$ 948,043			$ 1,997,313	$ (1,994,638)	$ 2,675	$ 18,724
Year 8	$ 1,072,068	$ 964,477			$ 2,036,545	$ (2,033,870)	$ 2,675	$ 21,399
Year 9	$ 1,095,383	$ 981,195			$ 2,076,578	$ (2,073,903)	$ 2,675	$ 24,074
Year 10	$ 1,119,226	$ 998,202			$ 2,117,428	$ (2,114,753)	$ 2,675	$ 26,749
Year 11	$ 1,143,610	$ 1,015,502			$ 2,159,112	$ (2,156,438)	$ 2,675	$ 29,424
Year 12	$ 1,168,548	$ 1,033,101			$ 2,201,649	$ (2,198,974)	$ 2,675	$ 32,099
Year 13	$ 1,194,050	$ 1,051,004			$ 2,245,055	$ (2,242,380)	$ 2,675	$ 34,773
Year 14	$ 1,220,132	$ 1,069,217			$ 2,289,348	$ (2,286,673)	$ 2,675	$ 37,448
Year 15	$ 1,246,804				$ 1,246,804	$ (1,244,129)	$ 2,675	$ 40,123
Year 16	$ 1,274,082				$ 1,274,082	$ (1,271,407)	$ 2,675	$ 42,798
Year 17	$ 1,301,978				$ 1,301,978	$ (1,299,303)	$ 2,675	$ 45,473
Year 18	$ 1,330,508				$ 1,330,508	$ (1,327,833)	$ 2,675	$ 48,148
Totals	$ 21,364,486	$ 14,259,739	$ 317,339	$ 325,747	$ 36,267,311	$ (36,219,163)	$ 48,148	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) Interest only payments are made by Edison Twp BOE during the construction period.
(3) As of July 1, 2021, all of former NJ Clean Energy Program incentive programs transitioned over to the investor-owned gas and electric utility companies. Subsequently, the BPU is requiring that all ESIP projects consult with the DCA and follow all DCA guidance regarding the procurement of all subcontractors.

Utility Inflation Details

Per Form VI, the annual inflation rate is 2.2% for electric and 2.4% for natural gas. The solar PPA rate escalates at 2.0% annually. Year 1 ESIP savings are escalated three years from the baseline year of 2022 to reflect a 24-month construction term.

Utility Inflation Worksheet						
Calendar Year	Savings Year	NET ANNUAL ELECTRIC COST SAVINGS (EXCLUDING SOLAR PPA SAVINGS)	ANNUAL NATURAL GAS COST SAVINGS	Net Solar Savings	ANNUAL Water & Sewer (Gal) COST SAVINGS	Total
2025	1	$602,313.97	$278,234.67	$855,135.37	$42,164.58	$1,777,848.59
2026	2	$615,564.87	$284,912.30	$869,964.50	$42,164.58	$1,812,606.25
2027	3	$629,107.30	$291,750.20	$885,049.83	$42,164.58	$1,848,071.91
2028	4	$642,947.66	$298,752.20	$900,395.80	$42,164.58	$1,884,260.24
2029	5	$657,092.51	$305,922.25	$916,006.88	$42,164.58	$1,921,186.23
2030	6	$671,548.54	$313,264.39	$931,887.64	$42,164.58	$1,958,865.16
2031	7	$686,322.61	$320,782.73	$948,042.73	$42,164.58	$1,997,312.66
2032	8	$701,421.71	$328,481.52	$964,476.87	$42,164.58	$2,036,544.68
2033	9	$716,852.99	$336,365.08	$981,194.87	$42,164.58	$2,076,577.51
2034	10	$732,623.75	$344,437.84	$998,201.61	$42,164.58	$2,117,427.78
2035	11	$748,741.48	$352,704.35	$1,015,502.06	$42,164.58	$2,159,112.47
2036	12	$765,213.79	$361,169.25	$1,033,101.29	$42,164.58	$2,201,648.91
2037	13	$782,048.49	$369,837.31	$1,051,004.44	$42,164.58	$2,245,054.82
2038	14	$799,253.56	$378,713.41	$1,069,216.73	$42,164.58	$2,289,348.28
2039	15	$816,837.14	$387,802.53		$42,164.58	$1,246,804.25
2040	16	$834,807.55	$397,109.79		$42,164.58	$1,274,081.93
2041	17	$853,173.32	$406,640.43		$42,164.58	$1,301,978.33
2042	18	$871,943.13	$416,399.80		$42,164.58	$1,330,507.51

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 5 – RISK, DESIGN, & COMPLIANCE

Assessment of Risks, Design & Compliance Issues

Moving from a conceptual design to engineered documents DCO has identified areas of the project that could change during the detailed design. The table below represents potential conceptual areas of concern that will need to be investigated further with a corresponding party responsible for the compliance of each item.

Issue	Category	Responsible Party
Alteration of expected Maintenance and Operational Savings	Risk	Edison Twp BOE
Disposition of Abandoned Equipment (Steam Piping, Condensate Piping, Oil Tanks, etc.)	Risk	Edison Twp BOE
New Natural Gas Distribution	Risk	Edison Twp BOE
Integrity of re-used Infrastructure	Risk	Edison Twp BOE
Life Safety System Coordination	Risk	Edison Twp BOE
Coordination with Edison Twp BOE Information Technology Department	Risk	Edison Twp BOE
Ventilation Compliance with Code	Compliance	Consulting Engineer
Temperature, Humidity and Air Change Compliance with Code	Compliance	Consulting Engineer
Boiler Capacity and Turndown	Design	Consulting Engineer
Natural Gas Regulator Compliance with Code	Compliance	Consulting Engineer
Undocumented Underground Utilities	Risk	Consulting Engineer
Code Compliance of Existing Electrical Infrastructure	Compliance	Consulting Engineer
Lighting Levels	Compliance	Consulting Engineer
Design Light Consortium rating for bulbs	Compliance	Consulting Engineer

Underwriters Laboratory Testing for retrofitted LED Lighting Systems	Compliance	Consulting Engineer
Lighting Retrofits within hard ceilings for fixtures and occupancy sensors	Risk	Consulting Engineer
Street/Parking Lot Pole Structural Integrity	Risk	Consulting Engineer
Unrealized Energy Savings 1. Energy Modeling 2. Performance Monitoring 3. Capacity of Equipment 4. Efficiency of Equipment 5. Run Hours of Equipment	Risk	DCO/ Consulting Engineer 1. DCO 2. DCO 3. Consulting Engineer / Basis of Design Vendor 4. Consulting Engineer / Basis of Design Vendor 5. Edison Twp BOE
Existing Plumbing Infrastructure with New Low Flow Devices	Design	Consulting Engineer
Adaptation to New RTUs (Curb, Electric, Ductwork, Condensate)	Design	Consulting Engineer / Basis of Design Manufacture
Structural Loads for Rooftop Equipment Replacement	Design	Consulting Engineer
Transformer Loading	Risk	Consulting Engineer
Site Work for Equipment	Design	Consulting Engineer
Condition of Roof Under Units	Risk	Consulting Engineer
Adequate Crane Lifts & Clearances	Design	Consulting Engineer / Rigger
Physical Space Constraints and Clearance for Equipment Replacement	Design	Consulting Engineer
Refrigerant Reclaim / Refrigerant Disposal	Compliance	Contractor
Existing Tie in Locations	Design	Consulting Engineer

Schedule Oversight	Risk	DCO Energy
Impact of Boiler Flue	Design	Consulting Engineer
Impact of Space Usage During Construction	Risk	Consulting Engineer & Edison Twp BOE
Scope changes relating to requests by Authorities Having Jurisdiction.	Risk	Edison Twp BOE (via contingency)
Department of Environmental Protection Permitting	Risk	Consulting Engineer
Modifications of Energy Saving Control Sequences and Setpoints impacting Energy Savings and Incentives	Risk	Edison Twp BOE
Post Construction Calibration of Sensors, Meters, & Safety Devices	Risk	Edison Twp BOE
Adequate time and access for bidding contractor site surveys	Risk	Edison Twp BOE
Utility Interconnection approval for the CHP Unit	Risk	Edison Twp BOE

Measurement & Verification (M&V) Plan

Our approach to M&V of energy savings aligns with the International Performance Measurement & Verification Protocol. More detailed information may be found below. It's most cost-effective to perform M&V using the least costly option that still adequately documents system performance and permits analysis of savings. This approach lowers the total cost of the program leaving more dollars available to perform more facility improvements. Depending upon which ECMs are implemented by Edison Twp BOE, the M&V plan proposed by DCO would incorporate one or more of the following options which outlines the four most common approaches for M&V:

Option A – Retrofit Isolation with Key Parameter Measurement	This option is Based on a combination of measured and estimated factors when variations in factors are not expected. Measurements are spot or short-term and are taken at the component or system level, both in the Baseline and post-installation cases. Measurements should include the key performance parameter(s) which define the energy use of the ECM. Estimated factors are supported by historical or manufacturer's data. Savings are determined by means of engineering calculations of Baseline and post-installation energy use Based on measured and estimated values.	Direct measurements and estimated values, engineering calculations and/or component or system models often developed through regression analysis. Adjustments to models are not typically required.
Option B – Retrofit Isolation with Parameter Measurement	This option is Based on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. Energy or proxies of energy use are measured continuously. Periodic spot or short-term measurements may suffice when variations in factors are not expected. Savings are determined form analysis of Baseline and reporting period energy use of proxies of energy use.	Direct measurements, engineering calculations, and/or component or system models often developed through regression analysis. Adjustments to models may be required.
Option C – Utility Data Analysis	This option is Based on long-term, continuous, whole-building utility meter, facility level, or sub-meter energy (or water) data. Savings are determined from analysis of Baseline and reporting period energy data. Typically, regression analysis is conducted to correlate with and adjust energy use to independent variables such as weather, but simple comparisons may also be used.	Based on regression analysis of utility meter data to account for factors that drive energy use. Adjustments to models are typically required.
Option D – Calibrated	Computer simulation software is used to model energy performance of a whole-facility (or sub-facility). Models must be calibrated with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires	Based on computer simulation model calibrated with whole-building or end-use

Computer Simulation	engineering expertise. Inputs to the model include facility characteristics; performance specifications of new and existing equipment or systems; engineering estimates, spot-, short-term, or long-term measurements of system components; and long-term whole-building utility meter data. After the model has been calibrated, savings are determined by comparing a simulation of the Baseline with either a simulation of the performance period or actual utility data	metered data or both. Adjustments to models are required.

Each of the options can be used for a wide array of energy efficiency upgrades and each has different costs and complexities associated with it. When selecting an M&V approach, the following general rule of thumb can be applied:

OPTION A

- When magnitude of savings is low for the entire project or a portion of the project
- The risk for not achieving savings is low

OPTION B

- For simple equipment replacement projects
- When energy savings values per individual measure are desired
- When interactive effects are to be ignored or are estimated using estimating methods that do not involve long term measurements
- When sub-meters already exist that record the energy use of subsystems under consideration

OPTION C

- For complex equipment replacement and controls projects
- When predicted energy savings are in excess of 10 to 20 percent as compared with the record energy use
- When energy savings per individual measure are not desired
- When interactive effects are to be included
- When the independent variables that affect energy, use are complex and excessively difficult or expensive

OPTION D

- When new construction projects are involved
- When energy savings values per measure are desired
- When Option C tools cannot cost effectively evaluate particular measures or their interactions with the building when complex Baseline adjustments are anticipated

DCO will perform measurement and verification of the energy units savings at the conclusion of each month in the first year of the energy units guarantee. After the first year, M&V will be performed and presented within 30 days of year end. Edison Twp BOE will work with DCO to provide necessary information and provide access to any buildings to allow DCO to properly verify and measure energy savings. DCO's energy guarantee will be based on units of energy saved as determined from the Baseline utility spend, or adjusted Baseline if original Baseline is determined by both parties to be inaccurate.

Adjustments to the Baseline and associated savings will be taken for weather, hours of operation, building usage, utility rate increases, code or statute changes, requirements listed in Table 1, and any other actions that adversely affect the savings beyond the control of DCO. Any savings discrepancies will be resolved to the satisfaction of both the Edison Twp BOE and DCO in a timely manner.

As part of the optional energy guarantee, DCO may use weather normalization procedures to correct for the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the Baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. If applicable, the weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Edison Twp BOE.

Maintenance Plan

Owner Tasks and Responsibilities:

As a general statement, Edison Twp BOE or its 3rd party service providers shall be responsible for providing ongoing maintenance through the duration of the M&V period. DCO will review operational procedures and schedules associated with such things as the building automation/control upgrades as well as the manufacturers' published requirements for all installed equipment be it: quarterly, semi-annually or annually. In most cases, Edison Twp BOE is already aware of or self-implementing similar maintenance practices on campus or has contracted a 3rd party for such services. Failure to properly maintain the equipment may cause energy savings goals to fall short.

Specific Areas of Consideration:

In order to sustain energy savings Edison Twp BOE's Staff will be required to implement new maintenance tasks and even modify existing policies and practices. Outlined are two examples of specific instances.

Example 1. Advanced Building Operations Programming:

Edison Twp BOE will be given specific training on the changes and advancements in the environmental operations and energy savings strategies. Edison Twp BOE will be responsible for following the agreed upon guidelines associated with programmed schedules and any use of override functions.

Example 2. Verification of Proper Operations: Mechanical Equipment

Edison Twp BOE will be required to assure that proper mechanical maintenance continues to be implemented on its mechanical equipment. Example: outside air dampers will require proper operation with the appropriate seals in order to maintain ECM(s) such as demand ventilation. DCO will periodically spot check system operations to verify the Owner or its 3rd party representative is implementing proper maintenance. Any deficiencies that may be identified will be brought to Edison Twp BOE's attention for correction.

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 6 – OPERATION & MAINTENANCE

It is critical to the success of achieving continued energy savings that Edison Twp BOE develop and implement an Operation and Maintenance Plan. In this section are some recommendations for Edison Twp BOE and/or 3rd party maintenance contractors.

Air Handling Units

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect the unit for cleanliness.
   b) Inspect the fan wheel and shaft for wear and clearance.
   c) Check the sheaves and pulleys for wear and alignment.
   d) Check the belts for tension, wear, cracks, and glazing.
   e) Verify tight bolts, set screws, and locking collars.
   f) Check dampers for wear, security and linkage adjustment.
   g) Verify clean condensate pan.
   h) Verify proper operation of the condensate drain.
   i) Verify clean air filters.
   j) Verify clean coils.
   k) Verify proper operation of the spray pump, if applicable.
   l) Verify smooth fan operation.
   m) Log operating conditions after system has stabilized.
   n) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the fan shaft bearings, if applicable.
   b) Lubricate the motor bearings, if applicable.
5. Controls and Safeties
   a) Test the operation of the low temperature safety device, if applicable.
   b) Test the operation of the high static pressure safety device, if applicable.
   c) Test the operation of the low static pressure safety device, if applicable.
   d) Check the thermal cutout on electric heaters, if applicable.
   e) Check the step controller, if applicable.
   f) Check and record supply air and control air pressure, if applicable.
   g) Verify the operation of the control system and dampers while the fan is operating.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration. This includes wiring to the electric heat, if applicable.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.

Heating Inspection

1. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch.
   i) Verify the integrity of the flue system.
   j) Verify the operation of the operating controls.
   k) Verify the burner sequence of operation.
   l) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   m) Perform combustion test. Make adjustments as necessary.
2. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.
3. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Scheduled Running Inspection

1. Check the general condition of the fan.

2. Verify smooth fan operation.
3. Check and record supply and control air pressure, if applicable.
4. Verify the operation of the control system.
5. Log the operating conditions after the system has stabilized.
6. Review operating procedures with operating personnel.
7. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Oil Sample/Spectrographic Analysis

1. Pull oil sample for spectrographic analysis

Refrigerant Sample/Analysis

1. Pull refrigerant sample for spectrographic analysis for contaminants (oil, water, and acid), using approved containers

Boilers

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Secure and drain the boiler.
   b) Open the fire and water side for cleaning and inspection.
   c) Check heating surfaces and water side for corrosion, pitting, scale, blisters, bulges, and soot.
   d) Inspect refractory.
   e) Clean fire inspection glass.
   f) Check blow-down valve packing, and lubricate.
   g) Check and test boiler blow-down valve.
   h) Perform hydrostatic test, if required.
   i) Verify proper operation of the level float.
   j) Gas Train Burner Assembly
      1. Check the gas train isolation valves for leaks.
      2. Check the gas supply piping for leaks.

3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot igniter assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating and discoloration.

k) Clean burner fan wheel and air dampers. Check fan for vibration.
l) Verify tightness on linkage set screws.
m) Check gas valves for leakage (where test cocks are provided).
n) Verify proper operation of the feed water pump.
o) Verify proper operation of the feed water treating equipment.

4. Controls and Safeties
   a) Disassemble and inspect low water cutoff safety device.
   b) Reassemble boiler low water cutoff safety device with new gaskets.
   c) Clean contacts in program timer, if applicable.
   d) Check the operation of the low water cutoff safety device and feed controls.
   e) Verify the setting and test the operation of the operating and limit controls.
   f) Verify the operation of the water level control.

Startup/Checkout Procedure

1. Verify proper water level in the boiler
2. Test the safety/relief valve after startup (full pressure test).
3. Clean or replace fuel filters.
4. Clean fuel nozzles.
5. Inspect clean, and functionally test the flame scanner and flame safeguard relay.
6. Clean and adjust the ignition electrode.
7. Replace the vacuum tube in the flame safeguard control, if applicable.
8. Perform pilot turn down test.

9. Verify proper steam pressure.
10. Perform combustion test and adjust the burner for maximum efficiency.
11. Test the following items:
    a) Firing rate
    b) Fuel/air ratio
    c) CO2
    d) CO
    e) NOX
    f) Perform smoke test.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mid-Season Running Inspection

1. Check the general condition of the unit.
2. Inspect the burner.
3. Adjust the burner controls to obtain proper combustion.
4. Check the operation of the pressure relief valve.
5. Check the operation of the low water cutoff and feed controls.
6. Check the setting and test the operation of the operating and limit controls.
7. Check the operation of the modulating motor.
8. Lift the safety/relief valves with at least 70% of rated pressure.
9. Blow down and try gauge cocks to confirm glass water level.
10. Check and test boiler blow down valve.
11. Log operating conditions after the system has stabilized.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Seasonal Shut-down Procedure

1. Shut down boiler at boiler controls.
2. Shut off fuel lines at main valves.
3. Review operating procedures
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Burners

Gas Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided

Oil Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.

12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided).

Dual Fuel Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided)

Cooling Towers

Startup/Checkout Procedure

1. Fill the basin and verify the float level.
2. Verify the operation of the basin heaters
3. Verify the operation, setpoint, and sensitivity of the basin heater temperature control device.

4. Start the condenser water pumps.
5. Verify the balance of the return water through the distribution boxes.
6. Verify proper operation of the bypass valve(s), if applicable.
7. Operate fan and verify smooth operation.
8. Log operation after system has stabilized.
9. Review operating procedures
10. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Comprehensive Bi-Annual Inspection

1. Perform following inspection and cleaning before starting the tower for the cooling season and during shutdown at end of season.
2. Record and report abnormal conditions, measurements taken, etc.
3. Review logs for operational problems and trends.
4. General Assembly
   a) Structure
      1. Disassemble all screens and access panels for inspection.
      2. Inspect the conditions of the slats, if applicable.
      3. Inspect the condition of the tower fill.
      4. Inspect the condition of the support structure.
      5. Inspect the condition of the basins (upper and lower) and/or spray nozzles.
      6. Verify clean basins and strainer(s).
      7. Verify the condition and operation of the basin fill valve system.
   b) Mechanical
      1. Inspect belts for wear, cracks, and glazing.
      2. Verify correct belt tension. Adjust the tension as necessary.
      3. Inspect sheaves and pulleys for wear, condition, and alignment.
      4. Inspect fan shaft and bearings for condition.
      5. Inspect fan assembly for condition, security, and clearances. (e.g. blade tip clearance).
4. Lubrication System
   a) Lubricate motor bearings.
   b) Lubricate fan shaft bearings.
5. Motor And Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.

c) Check the condition of the contacts for wear and pitting.
d) Check the contactor(s) for free and smooth operation.
e) Meg the motor(s) and record readings.
f) Check disconnect terminal block for wear, tightness and signs of overheating and discoloration.
g) Check the condition and operation of the basin heater contactor(s).

Shut-Down Procedure

1. Check the general condition of the tower.
2. Turn off electrical power to basin heaters, tower fans, and pipe heaters as necessary.
3. Drain tower and condenser water piping.
4. Review operating procedures
5. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Energy Management System

Maintenance Inspection

1. Review reports for operational problems and trends.
2. Make a back-up copy of the EMS program.
3. Check for loose or damaged parts or wiring.
4. Check for any accumulation of dirt or moisture. Clean if required.
5. Verify proper electrical grounding.
6. Verify control panel power supplies for proper output voltages.
7. Inspect interconnecting cables and electrical connections.
8. Verify that manual override switches are in the desired positions.
9. Check the operation of all binary and analog outputs, if applicable.
10. Calibrate control devices, if applicable.
11. Verify the correct time and date.
12. Check and update the holiday schedules and daylight savings time.
13. Via terminal mode, view the event log and input/output points for any unusual status or override conditions.
14. Clean the external surfaces of the panel enclosure.
15. Review operating program and parameters.

16. Check cable connections for security.
17. Review operating procedures
18. Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (Control Panels)

1. Control Panel
   a) Verify secure connections on all internal wiring, LAN, and communication links.
   b) Check for loose or damaged parts or wiring.
   c) Check for any accumulation of dirt or moisture. Clean if required.
   d) Remove excessive dust from heat sink surfaces
   e) Verify proper system electrical grounding.
   f) Verify proper output voltages on control panel power supplies.
   g) Check LED Indications to verify proper operation
   h) Verify LAN communications
   i) Verify that cards are seated and secured.
   j) Check wiring trunks and check for possible Error Code Indications
   k) Check voltage level of
   l) Verify the proper operation of critical control processes and points associated with this unit an make adjustments if necessary.
   m) Check Volatile memory available
   n) Cheek Non volatile memory available
   o) Check Processor idle time
   p) Clean external surfaces of the panel enclosure.
   q) Check modem operation, if applicable.
   r) View the event log and input/output points for any unusual status or override conditions.
   s) Verify correct time and date.
   t) Check and update holiday schedules, if applicable, and daylight savings time.
   u) Review operating procedures with operating personnel.
   v) Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (EMS - Sequence of Operations)

Central Plant

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for the chiller plant. An initial survey of current equipment operating parameters will be conducted within the first 60 days of the contract term during cooling season. This survey will include:

1. Chiller(s) operation
2. Cooling tower(s) operation
3. Pump(s) operation
4. Economizer operation (where applicable)
5. Environmental safety

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Building Systems

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for covered airside systems. An initial survey of current systems operating parameters will be conducted within the first 60 days of the contract term, except seasonally operated systems, which will be surveyed during the appropriate operating season. This survey will include:

1. Time schedule(s)
2. Reset schedule(s)
3. Economizer changeover (where applicable)
4. Setpoints
5. Energy Management routines

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Fans

Maintenance Procedure

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check the general condition of the unit.
   b) Verify tightness of the fan, fan guards, louvers, etc.
   c) Verify clean burner assembly.
   d) Check sheaves and pulleys for wear and alignment, if applicable.
   e) Check belts for tension, wear, cracks, and/or glazing.
4. Lubrication
   a) Lubricate the fan motor, if applicable.
   b) Lubricate the fan bearings as necessary.
5. Controls and Safeties
   a) Verify proper operation of the temperature control device.
   b) Verify proper operation of the high temperature control device.
   c) Verify proper operation of the fan switch.
   d) Verify proper operation of the pilot safety device, if applicable.
6. Electrical
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
7. Startup and Checkout
   a) Start the unit.
   b) Verify proper combustion air to the burner.
   c) Verify proper gas pressure to the burner.
   d) Check the flame for proper combustion.

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Disassemble all screens and panels necessary to gain access to the fan mechanism.
   b) Disassemble the control mechanism (AVPB only).
   c) Clean all accessible rotor components to include control pitch mechanism (AVPB only).

d) Inspect blades for wear.
e) Inspect blade arms for wear (AVPB only).
f) Check blade tip clearance.
g) Check for oil leak on the blade bearing housing (AVPB only).
h) Clean motor and fan housing.
i) Reassemble all removed screens and plates.

4. Lubrication
   a) Lubricate the motor bearings.
   b) Lubricate the shaft bearings (AVPA only).
5. Controls and Safeties
   a) Test the operation of the high static safety device. Calibrate and record setting.
   b) Test the operation of the low static safety device. Calibrate and record setting.
   c) Test the operation of the vibration safety device. Calibrate and record setting.
   d) Verify the operation of the phase monitor, if applicable.
   e) Inspect pneumatic and electrical controls for condition and calibration.
   f) Verify proper operation.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Clean the disconnect switch and cabinet at the fan, if applicable.
   c) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   d) Check the condition of the contacts for wear and pitting.
   e) Check the contactors for free and smooth operation.
   f) Meg the motor and record readings.
7. Startup / Checkout Procedure
   a) Start the fan.
   b) Verify the operation of the starter.
   c) Check and record supply and control air pressure.
   d) Verify the operation of the control system while the fan is operating.
   e) Log the operating conditions after the system has stabilized.
   f) Review operating procedures with operating personnel.
   g) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Scheduled Running Inspection (fans)

1. Check the general operation of the fan.

2. Check and record supply and control air pressure.
3. Verify the operation of the control system.
4. Log the operating conditions after the system has stabilized.
5. Review operating procedures with operating personnel.
6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Annual Inspection (fans)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Verify tight bolts, set screws, and locking collars.
   b) Inspect sheaves and pulleys for wear and alignment.
   c) Inspect belts for tension, wear, cracks, and glazing.
   d) Inspect dampers for wear, security, and clearances, if applicable.
   e) Verify clean air filters.
   f) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate fan bearings.
   b) Lubricate motor bearings, if applicable.
5. Controls and Safeties
   a) Verify the operation of the control system while the fan is operating.
   b) Verify the setting of the low temperature safety device, if applicable.
   c) Verify the operation of the pre-heat control device, if applicable.
   d) Verify the operation of the cooling control device, if applicable.
   e) Verify the operation of the re-heat control device, if applicable.
   f) Verify the operation of the humidity control device, if applicable.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.
   f) Check volts and amps of the motor.

Lubricate/Grease Bearings

1. Lubricate and/or grease bearings according to manufacturer's specifications

MEG Motor

1. Check the integrity of the insulation on the motor windings and the motor leads, using a megohm meter.

Coils

Maintenance Procedure

1. Record and report abnormal conditions.
2. Visually inspect the coil for leaks.
3. Inspect the coil for cleanliness.

Pumps

Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check motor shaft and pump shaft for alignment, if applicable.
   b) Inspect the coupling for wear.
   c) Verify that the shaft guard is in place and tight, if applicable.
   d) Verify water flow through the pump.
   e) Check for leaks on the mechanical pump seals, if applicable.
   f) Verify proper drip rate on the pump seal packing, if applicable.
   g) Verify smooth operation of the pump.
   h) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the motor bearings as necessary.
   b) Lubricate the pump bearings as necessary.
5. Motor and Starter

a) Clean the starter and cabinet.
b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
c) Meg the motor.
d) Verify tight connections on the motor terminals.
e) Check the condition of the contacts for wear and pitting, if applicable.
f) Check the contactors for free and smooth operation.
g) Verify proper volts and amps.

Pump Run Inspection

1. Verify smooth operation of the pump.
2. Check for leaks on the mechanical pump seals, if applicable.
3. Verify proper drip rate on the pump seal packing, if applicable.
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mechanical Starters with Electronic Controls

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check condition of the contacts for wear and pitting.
4. Check contactors for free and smooth operation.
5. Check the mechanical linkages for wear, security, and clearances.
6. Verify the overload settings.

VFD Starters

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check the tightness of the motor terminal connections.
4. Verify the operation of the cooling loop.
5. Verify proper operation of the frequency drive.

Rooftop Units

Comprehensive Annual Maintenance

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Visually inspect condenser tubes for cleanliness.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low water temperature control device. Calibrate and record setting.
   e) Test the low evaporator pressure safety device. Calibrate and record setting.
   f) Test the oil pressure safety device. Calibrate and record setting, if applicable.
   g) Check programmed parameters of RCM control, if applicable.
5. Lubrication System
   a) Check oil level in the compressor.
   b) Test oil for acid content and discoloration. Make recommendations to the customer Based on the results of the test.
   c) Verify the operation of the oil heater. Measure amps and compare reading with the watt rating of the heater.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Check the tightness of the motor terminal connections.
   f) Meg the motor and record readings.
   g) Verify the operation of the electrical interlocks.
   h) Measure voltage and record. Voltage should be nominal voltage ± 10%.

Comprehensive Maintenance Inspection (RTU Heating Cycle)

1. Perform heating inspection/maintenance applicable to the unit (steam/hot water, gas, electric).

2. Verify smooth operation of the fans.
3. Check the belts for tension, wear, cracks, and glazing.
4. Verify clean air filters.
5. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch. i.. Verify the integrity of the flue system.
   i) Verify the operation of the operating controls.
   j) Verify the burner sequence of operation.
   k) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   l) Perform combustion test. Make adjustments as necessary.
6. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.

7. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Mid-Season Cooling Inspection (RTU)

1. Check the general condition of the unit.
2. Log the operating condition after system has stabilized.
3. Verify the operation of the control circuits.
4. Analyze the recorded data. Compare the data to the original design conditions.

5. Review operating procedures with operating personnel.
6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Maintenance Inspection (RTU - Cooling Cycle)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Check pulleys and sheaves for wear and alignment.
   e) Check belts for tension, wear, cracks, and glazing.
   f) Verify clean evaporator coil, blower wheel, and condensate pan.
   g) Verify clean air filters.
   h) Verify proper operation of the condensate drain.
   i) Verify proper operation of the dampers and/or inlet guide vanes, if applicable.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low evaporator pressure safety device. Calibrate and record setting, if applicable.
   e) Test the high condenser pressure safety device. Calibrate and record setting, applicable.
   f) Test the oil pressure safety device, if applicable. Calibrate and record setting.
   g) Test the high static pressure safety device, if applicable. Calibrate and record setting.
   h) Verify the operation of the static pressure control device, if applicable.
5. Lubrication
   a) Verify the operation of the oil heater, if applicable.
   b) Lubricate the fan bearings as required.
   c) Lubricate the fan motor bearings as required.
   d) Lubricate the damper bearings, if applicable.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.

c) Check the condition of the contacts for wear and pitting.
d) Check the contactors for free and smooth operation.

7. Startup /Checkout Procedure
   a) Verify the operation of the oil heater.
   b) Verify full water system, including the cooling tower and the condenser.
   c) Verify clean cooling tower and strainers.
   d) Test all flow-proving devices on the condenser water circuit.
   e) Start the condenser water pump and the cooling tower fan(s).
   f) Verify flow rate through the condenser.
   g) Start the unit.
   h) Verify smooth operation of the compressor(s) and fan(s).
   i) Check the setpoint and sensitivity of the temperature control device.
   j) Verify the operation of the condenser water temperature control device.
   k) Verify clean condenser using pressure and temperature.
   l) Check operation and setup of the Unit Control Module.
   m) Check the superheat and subcooling on the refrigeration circuit(s).
   n) Log the operating conditions after the system has stabilized.
   o) Review operating procedures with operating personnel.
   p) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

SECTION 7 – OPTIONAL ENERGY GUARANTEE

OPTIONAL ENERGY GUARANTEE OVERVIEW

NOTE: *The following is meant only to serve as a description of an optional energy guarantee and does not constitute any contractual obligations between the Edison Twp BOE and DCO. If Edison Twp BOE chooses to implement an energy guarantee contract, a separate document will be used Based on mutual agreement and acceptance of all parties of its terms and conditions.*

A successful energy project consists of a partnership between an ESCO and Owner. Both parties have defined roles and accept their individual responsibilities as well as support any joint initiatives of the program as defined in this document. Both DCO and the Edison Twp BOE will have a role in ongoing maintenance and operations as defined in the agreed-upon energy guarantee contractual documents. Both parties will be required to meet their obligations for the guaranteed energy units savings (referred to as “guarantee or savings”) to be achieved and to ensure the guarantee stays intact.

DCO will guarantee Edison Twp BOE will achieve 100% of the total energy units savings per the provisions of the agreed-upon energy guarantee contractual documents Based on the final selection of ECMs and their associated energy savings as measured and verified by the Owner’s third-party, independent firm. The energy savings will be in energy units, not dollars as DCO has no control over the costs of utilities. The energy units guarantee contract shall commence thirty (30) days after the start-up and commissioning of the last Energy Conservation Measure (ECM) and be enforced for a period of one (1) year or until terminated by Edison Twp BOE.

SAVINGS VERIFICATION

There are events that cause energy savings to change. Edison Twp BOE and DCO will agree to Baseline energy consumption that represents the facility’s energy use and cost prior to the date of any Agreement (the “Base Year”) and parameters, which affect the energy usage and cost of the facility, including but not limited to, utility rates, local weather profile, facility square footage, environmental conditions, schedules (e.g., lighting, HVAC) and an inventory of equipment in the facility. Energy savings are determined by comparing measured energy use or demand before and after implementation of an energy savings program.

ECM ENERGY SAVINGS = BASELINE ENERGY USE – POST INSTALLATION ENERGY USE +/- ADJUSTMENTS

Changes in estimated energy savings fall into two categories. These categories are Routine Adjustments and Non-Routine Adjustments. Routine Adjustments are expected changes during the savings reporting period to energy governing factors (e.g. weather). DCO uses IPMVP approved mathematical techniques to determine adjustments. Non-Routine Adjustments include energy-governing factors which are not usually expected to change, such as the facility size, the design and operation of installed equipment, occupancy and the type of occupants or any physical changes to the building or equipment that impact the facilities' utility use. These factors will be monitored for change throughout the reporting period.

DCO will perform monthly utility bill analysis and audit reports which compare the current year with base year energy consumption and costs. DCO will perform periodic on-site analysis to determine whether mechanical and electrical systems are operating at optimal efficiency and to assess the occupancy and operational schedules of the buildings.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct for the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the Baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. The weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Edison Twp BOE.

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

APPENDICIES

APPENDIX LIST	
APPENDIX A	Construction Contingency Allowance
APPENDIX B	Design Bid Build Procedures
APPENDIX C	Operations & Maintenance Savings
APPENDIX D	Project Changes in Financing
APPENDIX E	Incentives in Debt Service
APPENDIX F	ECM Breakdown by Building
APPENDIX G	Energy Savings Supplemental Information
APPENDIX H	Local Government Energy Audits

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ENERGY SAVINGS PLAN

APPENDIX A – CONSTRUCTION CONTINGENCY ALLOWANCE

Appendix A – Construction Contingency Allowance

Experience shows that during the construction phase there are four major categories of potential change of scope issues that benefit from having an appropriate Construction Contingency Allowance (CCA).

- Unknown conditions
- Building inspector's modifications
- Project owner requested changes
- Design clarifications or modifications

Unknown Conditions

Renovations to older facilities have greater potential for revealing unknown. Missing or inaccurate Blueprints, deviations from the original blueprints by the original builder and unknown or undocumented modifications during the life of the facility.

Areas such as behind a wall/roof/equipment or under the slab can bring unforeseen conditions which can delay the new construction and change the anticipated scope of the work. Therefore, it is advisable to dedicate a CCA that is higher than that for new construction.

Building Inspection Modifications

A plan review for the local building jurisdiction reviews the construction documents prior to issuing a building permit. However, there remains the likelihood that the building inspector will request modifications to the plans Based upon experience and their interpretation of the applicable building code.

While we can ask for code review and documentation, if you hope to get a Certificate of Occupancy under a tight schedule from this same inspector requested modifications will need to be implemented as successfully appeals take time.

Whether it is adding an extra exit sign, smoke detector or fire extinguisher, or whether it is something more significant, it may require more work from the contractor, thus added expense. The CCA is intended to be the source of funds necessary for these requested modifications.

Project Owner Requested Changes

It is nearly impossible to express your every desire during the design phase. You will always see something during construction that you would like to change.

There is nothing necessarily wrong with that.

The CCA is intended to be the source of funds necessary for these requested changes.

Design Clarifications or Modifications

No designer has ever developed the perfect set of construction documents.

There are always items that can be detailed better or more clearly. The design intent should be adequately reflected in the drawings and specifications so that the contractor can bid and build the ECM to meet the design intent.

However, there will be times during construction when the builder will not be readily able to identify the exact intent of particular details or systems. At that time the builder will submit a Request for Information (RFI) to the designer for clarification or more information. The designer will issue clarifications or directives so that the builder can continue to meet the design intent.

On occasion, the RFI will reveal that something more than was shown in the construction documents is necessary to fulfill the design intent. The clarification or modification may impact the scope of the work to a degree that additional construction costs become necessary.

As long as the design omission is not negligent, the CCA is intended to be the source of funds necessary for these design clarifications or modifications.

Allowance Method

The budgetary costs carried in the project are Based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a database of actual installed costs for various ECMs.

a. Allowance Amount (5% of Hard Costs)

BID PACKAGE ALLOWANCE SCHEDULE	
ECM	**CONTINGENCY AMOUNT**
Solar PPA	$0
Roof Upgrades	$352,350
LED Tube Retrofit	$92,255
Lighting Controls	$53,646
Energy Management System - Plant Equipment	$27,391
Boiler Replacement	$88,540
Asbestos Abatement	$22,500
Building Envelope Weatherization	$35,351
Water Conservation	$9,845
Retrocommissioning	$14,550
Pipe and Valve Insulation	$12,451
PC Power Management	$7,205
eTemp Refrigeration Sensor	$4,095
Plug Load Controls	$8,834
Steam Trap Replacement	$9,365
Combined Heat & Power Unit	$19,474
Rooftop Unit Replacement	$24,845
Energy Management System - Terminal Equipment	$158,986
Variable Frequency Drives on HW Pumps	$13,904
Unit Ventilator Replacement	$19,313
Exhaust Fan Replacement	$6,150
Addition of Cooling	$16,094
TOTAL	**$997,143**

Project total construction contingency allowance amount is 5% of estimated hard costs and is agreed upon.

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- Edison BOE

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ENERGY SAVINGS PLAN

APPENDIX B – DESIGN BID BUILD

Appendix B – Design Bid Build Procedures

Design–bid–build (or **design/bid/build**, and abbreviated **D–B–B** or **D/B/B** accordingly), also known as **Design–tender** (or "design/tender") **traditional method** or **hard bid** is the method of delivery for this project.

Design–bid–build is the traditional method for project delivery and differs in several substantial aspects from design–build.

There are three main sequential phases to the design–bid–build delivery method:

- The design phase
- The bidding (or tender) phase
- The construction phase

Design Phase

In this phase DCO will design and produce bid documents, including construction drawings and technical specifications, on which various contractors will in turn bid to construct the project.

The Energy Savings Plan (ESP) is intended to document owner's project requirements and provide a conceptual and/or schematic design and good faith estimates.

With the ESP DCO will bring in other design professionals including mechanical, electrical, and plumbing engineers (MEP specifications engineers), a fire protection engineer, structural engineer, sometimes a civil engineer and a landscape architect to help complete the construction drawings and technical.

The design document should reflect the intent of the energy savings plan for scope, price, savings, operations & maintenance savings, incentive and schedule.

The finished bid documents are coordinated by the DCO and owner for issuance to contractors during the bid phase.

Bid (or tender) phase

Bidding is according to NJ Public Bid Law and is "open", in which any qualified bidder may participate.

The various contractors bidding obtain bid documents, and then put them out to multiple subcontractors for bids on sub-components of the project.

Questions may arise during the bid period, and DCO will issue clarifications or corrections to the bid documents in the form of addenda.

From these elements, the contractor compiles a complete bid for submission by the established closing date and time bid date.

Bids are to be Based on a base bid lump sum plus alternates, bid requirements and alternates are elucidated within the bid documents.

Once bids are received, DCO reviews the bids, seeks any clarifications required of the bidders, investigates contractor qualifications, ensures all documentation is in order (including bonding if required), and advises the owner as to the ranking of the bids.

If the bids fall in a range acceptable to the owner, the project is awarded to the contractor with the lowest reasonable bid.

In the event that all of the bids do not satisfy the needs of the owner the following options become available to DCO:

- Re-bid the construction of the project on a future when monies become available and/or construction costs go down.
- Revise the design of that ECM (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The revised bid documents can then be issued again for bid.
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.
- Revise the design of future ECM(s) (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The current bid package can then be contracted
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.

Construction phase

Once the construction of the project has been awarded to the contractor, the bid documents (e.g., approved construction drawings and technical specifications) may not be altered.

The necessary permits (for example, a building permit) must be achieved from all jurisdictional authorities in order for the construction process to begin.

Should design changes be necessary during construction, whether initiated by the contractor, owner, or as discovered by the architect, DCO will issue sketches or written clarifications and handle the project through allowance (See Appendix A).

The contractor may be required to document "as built" conditions to the owner.

Bidding Method

1. To achieve energy savings and fund debt service payments as rapidly as possible the bid packages will be bid in the following order:

BID METHOD SCHEDULE		
ECM	COST + ALLOWANC	SAVINGS
Solar PPA	$0	$796,622
Roof Upgrades	$7,399,343	$15,706
LED Tube Retrofit	$1,937,345	$327,591
Lighting Controls	$1,126,573	$62,185
Energy Management System - Plant Equipment	$575,204	$97,031
Boiler Replacement	$1,859,341	$27,945
Asbestos Abatement	$472,500	$0
Building Envelope Weatherization	$742,362	$53,153
Water Conservation	$206,750	$48,404
Retrocommissioning	$305,550	$38,665
Pipe and Valve Insulation	$261,470	$50,308
PC Power Management	$151,304	$22,504
eTemp Refrigeration Sensor	$86,002	$31,411
Plug Load Controls	$185,504	$22,674
Steam Trap Replacement	$196,670	$19,675
Combined Heat & Power Unit	$408,956	$17,925
Rooftop Unit Replacement	$521,753	$9,806
Energy Management System - Terminal Equipment	$3,338,713	$10,370
Variable Frequency Drives on HW Pumps	$291,984	$10,790
Unit Ventilator Replacement	$405,563	$771
Exhaust Fan Replacement	$129,150	$2,138
Addition of Cooling	$337,969	-$3,514
TOTAL	**$20,940,006**	**$1,662,161**

2. Bids in group 1 (Green) are within 15% of budget value they will be awarded.
3. Bids in group 2 (Yellow) may be value engineered from the project to meet budget
    a. DCO will provide the impact of ECMs value engineered:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
4. Bids in group 3 (Red) may be value engineered **or removed** from the project to meet budget
    a. DCO will provide the impact of ECMs value engineered or removed:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
5. As per ESIP law DCO fee will be applied to the ECM hard cost.
    a. DCO will receive no compensation for bids that are under budget
    b. DCO will receive no penalty for bids that are over budget
6. If the budget overruns make savings unachievable at the current budget, DCO will provide additional ECMs above the budget to meet the required energy savings

Project bidding strategy is agreed upon.

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ENERGY SAVINGS PLAN

APPENDIX C – OPERATIONS AND MAINTENANCE SAVINGS

Appendix C – Operation & Maintenance Savings

Operations and Maintenance and other non-energy-related cost savings are allowable in NJ ESIPs, and are defined as reduction in expenses (other than energy cost savings) related to energy and water consuming equipment:

Energy-related cost savings can result from avoided expenditures for operations, maintenance, equipment repair, or equipment replacement due to the ESIP project.

Sources of O&M savings include:

- Termination of service personnel
- Lower maintenance service contract costs
- Decrease in repair costs
    - Avoided repair and replacement costs as a result of replacing old and unreliable equipment
    - Material savings due to new equipment warranties
    - Material savings due to the longer life items not needing replacement
        - In particular, reduction in florescent bulbs due to LED

Termination of service personnel

As a result of the ESIP, a number of the client's maintenance staff members may no longer be required. If there will be a reduction in the government's maintenance staff, O&M savings can be claimed.

A problem could arise if the maintenance staff is not reduced. Then it would be necessary to determine what new O&M responsibilities the facility has taken on, or savings should not be claimed. For example, it could be that a new building was constructed. During the performance period, it is important to establish that any increased maintenance was not due to the equipment installed under the ESIP

Lower maintenance service contract costs

Prior to the implementation of the ESIP mechanical and electrical equipment was maintained by a third party under a maintenance contract. The ESIP replaces the aging equipment with newer, more efficient equipment, which can reduce the service costs to the client.

Decrease in repair costs

The client is responsible for maintenance both before and after the equipment installation. Although there is no reduction in staff for which to claim labor savings, there will be cost savings on replacement materials.

Material-related savings frequently result from lighting and lighting controls projects.

For this project, lighting maintenance savings will result from the following:

1. Reduced material requirements (e.g., lamps)
2. Reduced operating time — Control measures increase equipment life by reducing the burn time of lamps and ballasts
3. Warranty-related savings — newly installed lamps, and fixtures come with a manufacturer warranty of 10 years.

Year 1 O&M Savings by ECM

EDISON TWP PUBLIC SCHOOLS		ANNUAL O&M COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$
1a	LED Tube Retrofit	$50,630
3	Boiler Replacement	$2,243
4	Steam Trap Replacement	$1,815
5	Variable Frequency Drives on HW Pumps	$650
6	Rooftop Unit Replacement	$1,972
7	Unit Ventilator Replacement	$293
17	Roof Upgrades	$23,928
20	Exhaust Fan Replacement	$1,194
	TOTALS	$82,724

Years 1-5 O&M Savings

Year	Annual Operational Savings
Year 1	**$ 82,724**
Year 2	**$ 82,724**
Year 3	**$ 50,630**
Year 4	**$ 50,630**
Year 5	**$ 50,630**

Note: Years 3-5 are lighting O&M savings only.

Project O&M Savings strategy is agreed upon.

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ENERGY SAVINGS PLAN

APPENDIX D – PROJECT CHANGES IN FINANCING

Appendix D – Project Changes in Financing

The Energy savings plan has been approved using:

Interest rate of:..... 4.00%
Term: ..... 18 Years
Construction Term..... 24 Months
Construction Interest Only Payment of ..... TBD by Edison Twp BOE financial advisor
Annual Surplus of no less than..... $2,400

During financing DCO will provide assistance but does not guarantee the timing of savings or incentives.

While beneficial to the client financing changes are the responsibility of the client, bond counsel and/or financial advisor. DCO represents in no way advice on these financial items

Financial items may include but are not limited to:

- Timing of payments
- Splitting payments into bi-annual, tri-annual, etc.
- Coordination with the client's fiscal year
- Local finance board material, forms and presentations
- Multiple tiered interest rates

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ENERGY SAVINGS PLAN

APPENDIX E – INCENTIVES IN DEBT SERVICE

Appendix E – Incentives in Debt Service

Incentive Calculations

All estimated incentive values for Edison Twp BOE ESIP project were based off PSE&G Prescriptive Rebates. The total incentive amount is estimated to be $564,657. The ESIP includes 80% ($325,747) toward project financing as shown on Form VI.

Incentive Data									
BUILDING	INCENTIVE TYPE	SOURCE	ECM	QUANTITY	UNITS	INCENTIVE $/UNIT	YEAR 1 INCENTIVE	SUBTOTAL	TOTAL
Edison High School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$29,328	$29,328	$39,043
Edison High School	Prescriptive	PSEG	Lighting Controls	334	Sensor	$25.00	$8,350	$8,350	
Edison High School	Prescriptive	PSEG	Plug Load Controls	91		$15.00	$1,365	$1,365	
John P. Stevens High School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$41,554	$41,554	$97,124
John P. Stevens High School	Prescriptive	PSEG	Lighting Controls	398	Sensor	$25.00	$9,950	$9,950	
John P. Stevens High School	Prescriptive	PSEG	Plug Load Controls	78		$15.00	$1,170	$1,170	
John P. Stevens High School	Prescriptive	PSEG	Boiler Replacement	10,000	per MBH	$3.50	$35,000	$35,000	
John P. Stevens High School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$9,450.00	$9,450	$9,450	
Herbert Hoover Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$19,657	$19,657	$30,532
Herbert Hoover Middle School	Prescriptive	PSEG	Lighting Controls	185	Sensor	$25.00	$4,625	$4,625	
Herbert Hoover Middle School	Prescriptive	PSEG	Plug Load Controls	60		$15.00	$900	$900	
Herbert Hoover Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,500.00	$3,500	$3,500	
Herbert Hoover Middle School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$1,850.00	$1,850	$1,850	
John Adams Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$17,284	$17,284	$47,264
John Adams Middle School	Prescriptive	PSEG	Lighting Controls	182	Sensor	$25.00	$4,550	$4,550	
John Adams Middle School	Prescriptive	PSEG	Plug Load Controls	62		$15.00	$930	$930	
John Adams Middle School	Prescriptive	PSEG	Boiler Replacement	6,000	per MBH	$3.50	$21,000	$21,000	
John Adams Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,500.00	$3,500	$3,500	
Thomas Jefferson Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$15,202	$15,202	$45,242
Thomas Jefferson Middle School	Prescriptive	PSEG	Lighting Controls	190	Sensor	$25.00	$4,750	$4,750	
Thomas Jefferson Middle School	Prescriptive	PSEG	Plug Load Controls	86		$15.00	$1,290	$1,290	
Thomas Jefferson Middle School	Prescriptive	PSEG	Boiler Replacement	6,000	per MBH	$3.50	$21,000	$21,000	
Thomas Jefferson Middle School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$3,000.00	$3,000	$3,000	
Woodrow Wilson Middle School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$15,249	$15,249	$21,634
Woodrow Wilson Middle School	Prescriptive	PSEG	Lighting Controls	205	Sensor	$25.00	$5,125	$5,125	
Woodrow Wilson Middle School	Prescriptive	PSEG	Plug Load Controls	84		$15.00	$1,260	$1,260	
Benjamin Franklin Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$9,634	$9,634	$40,114
Benjamin Franklin Elementary School	Prescriptive	PSEG	Lighting Controls	132	Sensor	$25.00	$3,300	$3,300	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Plug Load Controls	72		$15.00	$1,080	$1,080	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Boiler Replacement	7,000	per MBH	$3.50	$24,500	$24,500	
Benjamin Franklin Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
James Madison Intermediate School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$10,052	$10,052	$25,757
James Madison Intermediate School	Prescriptive	PSEG	Lighting Controls	91	Sensor	$25.00	$2,275	$2,275	
James Madison Intermediate School	Prescriptive	PSEG	Plug Load Controls	42		$15.00	$630	$630	
James Madison Intermediate School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
James Madison Intermediate School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$2,300.00	$2,300	$2,300	
James Madison Primary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$9,226	$9,226	$14,961
James Madison Primary School	Prescriptive	PSEG	Lighting Controls	108	Sensor	$25.00	$2,700	$2,700	
James Madison Primary School	Prescriptive	PSEG	Plug Load Controls	49		$15.00	$735	$735	
James Madison Primary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$2,300.00	$2,300	$2,300	

Incentive Data									
BUILDING	INCENTIVE TYPE	SOURCE	ECM	QUANTITY	UNITS	INCENTIVE $/UNIT	YEAR 1 INCENTIVE	SUBTOTAL	TOTAL
James Monroe Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$0	$0	
James Monroe Elementary School	Prescriptive	PSEG	Lighting Controls		Sensor	$25.00	$0	$0	$735
James Monroe Elementary School	Prescriptive	PSEG	Plug Load Controls	49		$15.00	$735	$735	
John Marshall Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$13,091	$13,091	
John Marshall Elementary School	Prescriptive	PSEG	Lighting Controls	134	Sensor	$25.00	$3,350	$3,350	
John Marshall Elementary School	Prescriptive	PSEG	Plug Load Controls	64		$15.00	$960	$960	$26,001
John Marshall Elementary School	Prescriptive	PSEG	Boiler Replacement	2,000	per MBH	$3.50	$7,000	$7,000	
John Marshall Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
Lincoln Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$8,900	$8,900	
Lincoln Elementary School	Prescriptive	PSEG	Lighting Controls	98	Sensor	$25.00	$2,450	$2,450	
Lincoln Elementary School	Prescriptive	PSEG	Plug Load Controls	60		$15.00	$900	$900	$33,481
Lincoln Elementary School	Prescriptive	PSEG	Boiler Replacement	6,066	per MBH	$3.50	$21,231	$21,231	
Lindeneau Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$4,070	$4,070	
Lindeneau Elementary School	Prescriptive	PSEG	Lighting Controls	30	Sensor	$25.00	$750	$750	
Lindeneau Elementary School	Prescriptive	PSEG	Plug Load Controls	53		$15.00	$795	$795	$12,615
Lindeneau Elementary School	Prescriptive	PSEG	Boiler Replacement	2,000	per MBH	$3.50	$7,000	$7,000	
Martin Luther King Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$12,250	$12,250	
Martin Luther King Elementary School	Prescriptive	PSEG	Lighting Controls	111	Sensor	$25.00	$2,775	$2,775	
Martin Luther King Elementary School	Prescriptive	PSEG	Plug Load Controls	42		$15.00	$630	$630	$26,780
Martin Luther King Elementary School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
Martin Luther King Elementary School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$625.00	$625	$625	
Washington Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$10,920	$10,920	
Washington Elementary School	Prescriptive	PSEG	Lighting Controls	104	Sensor	$25.00	$2,600	$2,600	
Washington Elementary School	Prescriptive	PSEG	Plug Load Controls	55		$15.00	$825	$825	$37,276
Washington Elementary School	Prescriptive	PSEG	Boiler Replacement	6,066	per MBH	$3.50	$21,231	$21,231	
Washington Elementary School	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$1,700.00	$1,700	$1,700	
Woodbrook Elementary School	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$11,300	$11,300	
Woodbrook Elementary School	Prescriptive	PSEG	Lighting Controls	186	Sensor	$25.00	$4,650	$4,650	
Woodbrook Elementary School	Prescriptive	PSEG	Plug Load Controls	101		$15.00	$1,515	$1,515	$29,565
Woodbrook Elementary School	Prescriptive	PSEG	Boiler Replacement	3,000	per MBH	$3.50	$10,500	$10,500	
Woodbrook Elementary School	Prescriptive	PSEG	Variable Frequency Drives on HW Pumps	Various	Various	$1,600.00	$1,600	$1,600	
FDR Round Building	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$368	$368	
FDR Round Building	Prescriptive	PSEG	Lighting Controls	39	Sensor	$25.00	$975	$975	
FDR Round Building	Prescriptive	PSEG	Plug Load Controls	21		$15.00	$315	$315	$0
FDR Round Building	Prescriptive	PSEG	PC Power Management	#REF!		$10.00	#REF!	#REF!	
Edison Early Learning Center	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$1,416	$1,416	
Edison Early Learning Center	Prescriptive	PSEG	Lighting Controls	17	Sensor	$25.00	$425	$425	
Edison Early Learning Center	Prescriptive	PSEG	Plug Load Controls	5		$15.00	$75	$75	$4,241
Edison Early Learning Center	Prescriptive	PSEG	Boiler Replacement	2	per Boiler	$850.00	$1,700	$1,700	
Edison Early Learning Center	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$625.00	$625	$625	
Edison Education Center	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$19,475	$19,475	
Edison Education Center	Prescriptive	PSEG	Lighting Controls	145	Sensor	$25.00	$3,625	$3,625	
Edison Education Center	Prescriptive	PSEG	Plug Load Controls	23		$15.00	$345	$345	$30,920
Edison Education Center	Prescriptive	PSEG	Rooftop Unit Replacement	Various	Various	$7,475.00	$7,475	$7,475	
Building and Grounds	Prescriptive	PSEG	LED Tube Retrofit	Various	Various		$1,208	$1,208	
Building and Grounds	Prescriptive	PSEG	Lighting Controls	6	Sensor	$25.00	$150	$150	$1,373
Building and Grounds	Prescriptive	PSEG	Plug Load Controls	1		$15.00	$15	$15	

No implied and/or written guarantee is made with respect to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Edison Twp BOE acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

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DCO

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Edison Twp BOE

- Edison Twp BOE

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

APPENDIX F – ECM BREAKDOWN BY BUILDING

EDISON TWP PUBLIC SCHOOLS % SAVINGS BY BUILDING (T.O.R.)

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		UTILITY ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	THERMS	Water & Sewer (Gal)
Edison High School	250,499	30.4%	19.5%	27.0%	18.2%
John P. Stevens High School	220,287	37.9%	25.8%	28.2%	29.3%
Herbert Hoover Middle School	132,625	39.0%	33.5%	23.0%	17.7%
John Adams Middle School	93,041	44.7%	37.7%	27.3%	14.8%
Thomas Jefferson Middle School	90,514	47.5%	35.2%	28.4%	0.0%
Woodrow Wilson Middle School	102,122	33.2%	20.8%	33.0%	15.9%
Benjamin Franklin Elementary School	56,975	55.1%	21.7%	39.2%	0.0%
James Madison Intermediate School	44,000	22.0%	16.9%	45.6%	7.6%
James Madison Primary School	46,000	35.3%	27.5%	27.2%	-
James Monroe Elementary School	67,800	12.0%	0.0%	25.4%	16.6%
John Marshall Elementary School	62,517	35.4%	31.5%	36.7%	0.0%
Lincoln Elementary School	55,315	35.1%	26.1%	16.9%	38.8%
Lindeneau Elementary School	45,503	37.3%	9.1%	24.7%	0.0%
Martin Luther King Elementary School	54,136	43.4%	28.9%	28.9%	17.0%
Washington Elementary School	56,410	39.3%	17.7%	65.9%	15.0%
Woodbrook Elementary School	85,954	27.9%	17.1%	29.0%	17.2%
FDR Round Building	14,750	30.4%	-18.0%	-	-
Edison Early Learning Center	7,297	19.9%	8.1%	7.3%	0.0%
Edison Education Center	30,000	38.9%	31.8%	44.8%	19.3%
Building and Grounds	12,000	20.1%	20.6%	1.4%	17.2%
TOTALS	**1,527,745**	**34.5%**	**20.9%**	**28.5%**	**18.7%**

EDISON TWP PUBLIC SCHOOLS SAVINGS BY BUILDING BY UTILITY FROM SMART SELECT

EDISON TWP PUBLIC SCHOOLS BUILDINGS/FACILITIES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	THERMS	Water & Sewer (Gal)
Edison High School	250,499	456,219	99	35,992	95,155
John P. Stevens High School	220,287	733,464	173	35,677	965,775
Herbert Hoover Middle School	132,625	230,922	67	11,394	158,641
John Adams Middle School	93,041	200,176	59	13,432	79,715
Thomas Jefferson Middle School	90,514	182,244	52	13,355	0
Woodrow Wilson Middle School	102,122	193,873	50	10,721	218,680
Benjamin Franklin Elementary School	56,975	132,145	37	9,063	0
James Madison Intermediate School	44,000	110,715	32	8,517	91,918
James Madison Primary School	46,000	108,501	30	6,020	94,336
James Monroe Elementary School	67,800	58,631	0	4,336	49,895
John Marshall Elementary School	62,517	150,245	43	10,315	0
Lincoln Elementary School	55,315	111,745	30	12,032	326,134
Lindeneau Elementary School	45,503	64,692	15	5,266	0
Martin Luther King Elementary School	54,136	127,835	37	7,184	57,251
Washington Elementary School	56,410	142,847	38	16,298	121,338
Woodbrook Elementary School	85,954	161,029	41	11,382	122,429
FDR Round Building	14,750	36,977	(22)	0	26,029
Edison Early Learning Center	7,297	16,454	5	362	0
Edison Education Center	30,000	106,475	34	3,000	41,628
Building and Grounds	12,000	10,855	4	163	2,964
TOTALS	**1,527,745**	**3,336,043**	**824**	**214,508**	**2,451,888**

ECMs evaluated and included in the ESIP

EDISON TWP PUBLIC SCHOOLS			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of No_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	$	$	YEARS		kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
1a	Edison High School	LED Tube Retrofit	Y	$219,724	$51,452	($472)	$0	$0	$50,980	$13,488	$64,468	3.4		233,801	81.3	-456	0	752	2,186	251,841	218	517	1,087	PRESCRIPTIVE	$29,328	3.0
1b	Edison High School	Lighting Controls	Y	$139,230	$11,014	($108)	$0	$0	$10,906	$0	$10,906	12.8		49,945	17.6	-104	0	160	466	53,718	46	110	232	PRESCRIPTIVE	$8,350	12.0
2a	Edison High School	Energy Management System - Plant Equipment	Y	$34,978	$0	$10,480	$0	$0	$10,480	$0	$10,480	3.3		0	0.0	10,136	0	1,014	1,064	118,590	93	0	0		$0	3.3
2b	Edison High School	Energy Management System - Terminal Equipment	Y	$196,147	$4,015	$1,070	$0	$0	$5,085	$0	$5,085	38.6		21,132	0.0	1,034	0	176	311	35,349	30	47	98		$0	38.6
4	Edison High School	Steam Trap Replacement	Y	$110,485	$0	$11,682	$0	$0	$11,682	$1,592	$13,274	8.3		0	0.0	11,298	0	1,130	1,186	132,187	104	0	0		$0	8.3
9	Edison High School	Pipe and Valve Insulation	Y	$21,994	$0	$3,350	$0	$0	$3,350	$0	$3,350	6.6		0	0.0	3,240	0	324	340	37,908	30	0	0		$0	6.6
10	Edison High School	Building Envelope Weatherization	Y	$45,024	$1,131	$2,269	$0	$0	$3,400	$0	$3,400	13.2		5,954	0.0	2,194	0	240	287	32,220	26	13	28		$0	13.2
11	Edison High School	Water Conservation	Y	$15,488	$0	$508	$0	$919	$1,427	$0	$1,427	10.9		0	0.0	491	95,155	49	52	5,747	5	0	0		$0	10.9
12	Edison High School	Plug Load Controls	Y	$22,620	$2,974	$0	$0	$0	$2,974	$0	$2,974	7.6		15,652	0.0	0	0	53	150	17,218	15	35	73	PRESCRIPTIVE	$1,365	7.1
13	Edison High School	PC Power Management	Y	$46,951	$6,061	$0	$0	$0	$6,061	$0	$6,061	7.7		31,902	0.0	0	0	109	305	35,092	30	71	148		$0	7.7
14	Edison High School	Solar PPA	Y	$0	$184,199	$0	($27,630)	$0	$156,569	$0	$156,569	0.0		0	0.0	0	0		9,262	1,066,416	921	2,143	4,508		$0	0.0
16	Edison High School	eTemp Refrigeration Sensor	Y	$14,838	$7,669	$0	$0	$0	$7,669	$0	$7,669	1.9		40,365	0.0	0	0	138	386	44,402	38	89	188		$0	1.9
17	Edison High School	Roof Upgrades	Y	$749,105	$478	$1,522	$0	$0	$2,000	$14,425	$16,425	45.6		2,513	0.0	1,472	0	156	179	19,989	16	6	12		$0	45.6
18	Edison High School	Retrocommissioning	Y	$138,000	$10,441	$6,914	$0	$0	$17,355	$0	$17,355	8.0		54,955	0.0	6,687	0	856	1,227	138,683	114	121	256		$0	8.0
20	Edison High School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	John P. Stevens High School	LED Tube Retrofit	Y	$314,525	$71,073	($796)	$0	$0	$70,278	$8,512	$78,790	4.0		333,198	116.2	-660	0	1,071	3,114	358,797	310	736	1,549	PRESCRIPTIVE	$41,554	3.5
1b	John P. Stevens High School	Lighting Controls	Y	$161,739	$10,821	($128)	$0	$0	$10,693	$0	$10,693	15.1		50,641	17.9	-106	0	162	473	54,466	47	112	235	PRESCRIPTIVE	$9,950	14.2
2a	John P. Stevens High School	Energy Management System - Plant Equipment	Y	$34,978	$0	$9,333	$0	$0	$9,333	$0	$9,333	3.7		0	0.0	7,738	0	774	813	90,539	71	0	0		$0	3.7
2b	John P. Stevens High School	Energy Management System - Terminal Equipment	Y	$976,697	$1,609	$1,092	$0	$0	$2,702	$0	$2,702	361.5		8,793	0.0	906	0	121	179	20,270	17	19	41		$0	361.5
3	John P. Stevens High School	Boiler Replacement	Y	$1,168,101	$0	$22,836	$0	$0	$22,836	$1,949	$24,785	47.1		0	0.0	18,935	0	1,894	1,988	221,541	174	0	0	PRESCRIPTIVE	$35,000	45.7
5	John P. Stevens High School	Variable Frequency Drives on HW Pumps	Y	$278,080	$10,790	$0	$0	$0	$10,790	$650	$11,440	24.3		57,276	3.6	0	0	195	547	63,004	54	127	266	PRESCRIPTIVE	$9,450	23.5
9	John P. Stevens High School	Pipe and Valve Insulation	Y	$18,162	$0	$4,004	$0	$0	$4,004	$0	$4,004	4.5		0	0.0	3,320	0	332	349	38,848	31	0	0		$0	4.5
10	John P. Stevens High School	Building Envelope Weatherization	Y	$73,046	$1,811	$3,958	$0	$0	$5,769	$0	$5,769	12.7		9,895	0.0	3,282	0	362	439	49,281	40	22	46		$0	12.7
11	John P. Stevens High School	Water Conservation	Y	$58,698	$0	$474	$0	$17,724	$18,198	$0	$18,198	3.2		0	0.0	393	965,775	39	41	4,602	4	0	0		$0	3.2
12	John P. Stevens High School	Plug Load Controls	Y	$10,934	$2,616	$0	$0	$0	$2,616	$0	$2,616	4.2		14,292	0.0	0	0	49	137	15,722	14	32	66	PRESCRIPTIVE	$1,170	3.7
13	John P. Stevens High School	PC Power Management	Y	$7,658	$4,767	$0	$0	$0	$4,767	$0	$4,767	1.6		26,050	0.0	0	0	89	249	28,655	25	58	121		$0	1.6
14	John P. Stevens High School	Solar PPA	Y	$0	$285,252	$0	($44,424)	$0	$240,827	$0	$240,827	0.0		0	0.0	0	0		14,892	1,714,629	1,481	3,445	7,248		$0	0.0
15	John P. Stevens High School	Combined Heat & Power Unit	Y	$389,482	$25,092	($7,167)	$0	$0	$17,925	$0	$17,925	21.7		120,498	35.0	-5,943	0	-183	527	86,153	45	81	0		$0	21.7
16	John P. Stevens High School	eTemp Refrigeration Sensor	Y	$15,765	$8,081	$0	$0	$0	$8,081	$0	$8,081	2.0		44,160	0.0	0	0	151	422	48,576	42	98	205		$0	2.0
17	John P. Stevens High School	Roof Upgrades	Y	$2,072,814	$993	$3,451	$0	$0	$4,444	$0	$4,444	466.4	#	5,428	0.0	2,862	0	305	352	39,451	31	12	25		$0	466.4
18	John P. Stevens High School	Retrocommissioning	Y	$122,000	$11,572	$5,969	$0	$0	$17,541	$0	$17,541	7.0		63,233	0.0	4,949	0	711	1,124	127,465	106	140	294		$0	7.0
19	John P. Stevens High School	Asbestos Abatement	Y	$330,000	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0		$0	0.0
20	John P. Stevens High School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Herbert Hoover Middle School	LED Tube Retrofit	Y	$140,055	$25,928	($427)	$0	$0	$25,501	$1,835	$27,336	5.1		160,760	56.3	-324	0	516	1,502	173,046	150	355	748	PRESCRIPTIVE	$19,657	4.4
1b	Herbert Hoover Middle School	Lighting Controls	Y	$64,946	$4,873	($83)	$0	$0	$4,790	$0	$4,790	13.6		30,164	10.6	-63	0	97	282	32,442	28	67	140	PRESCRIPTIVE	$4,625	12.6
2a	Herbert Hoover Middle School	Energy Management System - Plant Equipment	Y	$34,978	$0	$9,128	$0	$0	$9,128	$0	$9,128	3.8		0	0.0	6,931	0	693	728	81,095	64	0	0		$0	3.8
2b	Herbert Hoover Middle School	Energy Management System - Terminal Equipment	Y	$438,249	$441	$0	$0	$0	$441	$0	$441	993.8		3,392	0.0	0	0	12	32	3,731	3	7	16		$0	993.8
5	Herbert Hoover Middle School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
6	Herbert Hoover Middle School	Rooftop Unit Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
0	Herbert Hoover Middle School	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	Herbert Hoover Middle School	Pipe and Valve Insulation	Y	$15,505	$0	$3,953	$0	$0	$3,953	$0	$3,953	3.9		0	0.0	3,002	0	300	315	35,119	28	0	0			3.9
10	Herbert Hoover Middle School	Building Envelope Weatherization	Y	$13,820	$254	$874	$0	$0	$1,128	$0	$1,128	12.3		1,951	0.0	664	0	73	88	9,911	8	4	9		$0	12.3
11	Herbert Hoover Middle School	Water Conservation	Y	$8,541	$0	$735	$0	$2,710	$3,445	$0	$3,445	2.5		0	0.0	558	158,641	56	59	6,525	5	0	0			2.5
12	Herbert Hoover Middle School	Plug Load Controls	Y	$9,661	$1,436	$0	$0	$0	$1,436	$0	$1,436	6.7		11,046	0.0	0	0	38	106	12,151	10	24	51	PRESCRIPTIVE	$900	6.1
13	Herbert Hoover Middle School	PC Power Management	Y	$2,163	$467	$0	$0	$0	$467	$0	$467	4.6		3,591	0.0	0	0	12	34	3,950	3	8	17		$0	4.6
14	Herbert Hoover Middle School	Solar PPA	Y	$0	$51,545	$0	($11,300)	$0	$40,245	$0	$40,245	0.0		0	0.0	0	0		3,788	436,150	377	876	1,844		$0	0.0
16	Herbert Hoover Middle School	eTemp Refrigeration Sensor	Y	$8,346	$2,452	$0	$0	$0	$2,452	$0	$2,452	3.4		18,860	0.0	0	0	64	180	20,746	18	42	88		$0	3.4
17	Herbert Hoover Middle School	Roof Upgrades	Y	$479,507	$151	$825	$0	$0	$976	$0	$976	491.4	#	1,158	0.0	627	0	67	77	8,605	7	3	5		$0	491.4
20	Herbert Hoover Middle School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	John Adams Middle School	LED Tube Retrofit	Y	$120,468	$20,355	($351)	$0	$0	$20,004	$4,077	$24,081	5.0		142,310	49.8	-286	0	457	1,330	153,199	133	315	662	PRESCRIPTIVE	$17,284	4.3
1b	John Adams Middle School	Lighting Controls	Y	$57,674	$3,781	($68)	$0	$0	$3,713	$0	$3,713	15.5		26,388	9.3	-55	0	85	246	28,382	25	58	123	PRESCRIPTIVE	$4,550	14.3
2a	John Adams Middle School	Energy Management System - Plant Equipment	Y	$34,978	$0	$8,568	$0	$0	$8,568	$0	$8,568	4.1		0	0.0	6,972	0	697	732	81,567	64	0	0		$0	4.1
2b	John Adams Middle School	Energy Management System - Terminal Equipment	Y	$367,539	$348	$0	$0	$0	$348	$0	$348	1,055.9		3,027	0.0	0	0	10	29	3,329	3	7	14		$0	1055.9
3	John Adams Middle School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
5	John Adams Middle School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
0	John Adams Middle School	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	John Adams Middle School	Pipe and Valve Insulation	Y	$19,725	$0	$5,269	$0	$0	$5,269	$0	$5,269	3.7		0	0.0	4,287	0	429	450	50,163	39	0	0		$0	3.7
10	John Adams Middle School	Building Envelope Weatherization	Y	$22,839	$384	$1,719	$0	$0	$2,103	$0	$2,103	10.9		3,336	0.0	1,399	0	151	179	20,036	16	7	16		$0	10.9
11	John Adams Middle School	Water Conservation	Y	$6,877	$0	$483	$0	$1,432	$1,916	$0	$1,916	3.6		0	0.0	393	79,715	39	41	4,602	4	0	0			3.6
12	John Adams Middle School	Plug Load Controls	Y	$9,523	$1,063	$0	$0	$0	$1,063	$0	$1,063	9.0		9,241	0.0	0	0	32	88	10,165	9	20	43	PRESCRIPTIVE	$930	8.1
13	John Adams Middle School	PC Power Management	Y	$12,028	$392	$0	$0	$0	$392	$0	$392	30.7		3,406	0.0	0	0	12	33	3,746	3	8	16		$0	30.7
14	John Adams Middle School	Solar PPA	Y	$0	$37,407	$0	($9,270)	$0	$28,137	$0	$28,137	0.0		0	0.0	0	0		3,108	357,808	309	719	1,513		$0	0.0
16	John Adams Middle School	eTemp Refrigeration Sensor	Y	$7,419	$1,309	$0	$0	$0	$1,309	$0	$1,309	5.7		11,385	0.0	0	0	39	109	12,524	11	25	53		$0	5.7
17	John Adams Middle School	Roof Upgrades	Y	$513,656	$124	$886	$0	$0	$1,011	$0	$1,011	508.1	#	1,082	0.0	721	0	76	86	9,630	8	2	5		$0	508.1
20	John Adams Middle School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Thomas Jefferson Middle School	LED Tube Retrofit	Y	$113,045	$15,962	($270)	$0	$0	$15,692	$8,681	$24,373	4.6		123,481	43.5	-255	0	396	1,153	132,847	115	273	574	PRESCRIPTIVE	$15,202	4.0
1b	Thomas Jefferson Middle School	Lighting Controls	Y	$84,745	$3,167	($54)	$0	$0	$3,113	$0	$3,113	27.2		24,484	8.6	-51	0	78	229	26,333	23	54	114	PRESCRIPTIVE	$4,750	25.7
2a	Thomas Jefferson Middle School	Energy Management System - Plant Equipment	Y	$35,516	$0	$8,783	$0	$0	$8,783	$0	$8,783	4.0		0	0.0	8,302	0	830	872	97,133	76	0	0		$0	4.0
2b	Thomas Jefferson Middle School	Energy Management System - Terminal Equipment	Y	$401,979	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0		$0	0.0
3	Thomas Jefferson Middle School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
5	Thomas Jefferson Middle School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
7	Thomas Jefferson Middle School	Unit Ventilator Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
8	Thomas Jefferson Middle School	Addition of Cooling	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	Thomas Jefferson Middle School	Pipe and Valve Insulation	Y	$16,948	$0	$3,409	$0	$0	$3,409	$0	$3,409	5.0		0	0.0	3,222	0	322	338	37,698	30	0	0			5.0
10	Thomas Jefferson Middle School	Building Envelope Weatherization	Y	$22,097	$330	$1,317	$0	$0	$1,646	$0	$1,646	13.4		3,366	0.0	1,244	0	136	163	18,261	15	7	16		$0	13.4
12	Thomas Jefferson Middle School	Plug Load Controls	Y	$12,093	$1,563	$0	$0	$0	$1,563	$0	$1,563	7.7		15,945	0.0	0	0	54	152	17,539	15	35	74	PRESCRIPTIVE	$1,290	6.9
13	Thomas Jefferson Middle School	PC Power Management	Y	$21,323	$281	$0	$0	$0	$281	$0	$281	75.8		2,870	0.0	0	0	10	27	3,157	3	6	13		$0	75.8
14	Thomas Jefferson Middle School	Solar PPA	Y	$0	$31,035	$0	($9,026)	$0	$22,010	$0	$22,010	0.0		0	0.0	0	0		3,026	348,357	301	700	1,473		$0	0.0
16	Thomas Jefferson Middle School	eTemp Refrigeration Sensor	Y	$5,564	$1,037	$0	$0	$0	$1,037	$0	$1,037	5.4		10,580	0.0	0	0	36	101	11,638	10	23	49		$0	5.4
17	Thomas Jefferson Middle School	Roof Upgrades	Y	$0	$149	$944	$0	$0	$1,093	$0	$1,093	0.0	#	1,519	0.0	892	0	94	108	12,112	10	3	7		$0	0.0
20	Thomas Jefferson Middle School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0

EDISON TWP PUBLIC SCHOOLS			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of No_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	$	$	YEARS		kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
1a	Woodrow Wilson Middle School	LED Tube Retrofit	Y	$106,653	$13,245	($326)	$0	$0	$12,919	$358	$13,277	8.0		115,568	40.3	-230	0	371	1,080	124,436	108	255	537	PRESCRIPTIVE	$15,249	6.9
1b	Woodrow Wilson Middle School	Lighting Controls	Y	$84,384	$3,229	($83)	$0	$0	$3,146	$0	$3,146	26.8		28,090	9.9	-59	0	90	262	30,212	26	62	131	PRESCRIPTIVE	$5,125	25.2
2a	Woodrow Wilson Middle School	Energy Management System - Plant Equipment	Y	$34,978	$0	$8,221	$0	$0	$8,221	$0	$8,221	4.3		0	0.0	5,794	0	579	608	67,788	53	0	0		$0	4.3
2b	Woodrow Wilson Middle School	Energy Management System - Terminal Equipment	Y	$364,311	$469	$0	$0	$0	$469	$0	$469	776.2		5,522	0.0	0	0	19	53	6,074	5	12	26		$0	776.2
0	Woodrow Wilson Middle School	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	Woodrow Wilson Middle School	Pipe and Valve Insulation	Y	$11,969	$0	$2,853	$0	$0	$2,853	$0	$2,853	4.2		0	0.0	2,011	0	201	211	23,527	18	0	0		$0	4.2
10	Woodrow Wilson Middle School	Building Envelope Weatherization	Y	$39,621	$520	$2,903	$0	$0	$3,423	$0	$3,423	11.6		6,120	0.0	2,046	0	225	273	30,669	25	14	28		$0	11.6
11	Woodrow Wilson Middle School	Water Conservation	Y	$7,569	$0	$608	$0	$3,921	$4,529	$0	$4,529	1.7		0	0.0	428	218,680	43	45	5,011	4	0	0			1.7
12	Woodrow Wilson Middle School	Plug Load Controls	Y	$13,252	$867	$0	$0	$0	$867	$0	$867	15.3		10,196	0.0	0	0	35	97	11,215	10	23	47	PRESCRIPTIVE	$1,260	13.8
13	Woodrow Wilson Middle School	PC Power Management	Y	$3,805	$858	$0	$0	$0	$858	$0	$858	4.4		10,096	0.0	0	0	34	96	11,106	10	22	47		$0	4.4
14	Woodrow Wilson Middle School	Solar PPA	Y	$0	$44,472	$0	($14,911)	$0	$29,561	$0	$29,561	0.0		0	0.0	0	0		4,998	575,518	497	1,156	2,433		$0	0.0
16	Woodrow Wilson Middle School	eTemp Refrigeration Sensor	Y	$4,637	$1,437	$0	$0	$0	$1,437	$0	$1,437	3.2		16,905	0.0	0	0	58	162	18,596	16	37	79		$0	3.2
17	Woodrow Wilson Middle School	Roof Upgrades	Y	$541,475	$117	$1,037	$0	$0	$1,154	$319	$1,473	367.6	#	1,375	0.0	731	0	78	90	10,062	8	3	6		$0	367.6
20	Woodrow Wilson Middle School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Benjamin Franklin Elementary School	LED Tube Retrofit	Y	$71,878	$10,705	($162)	$0	$0	$10,543	$916	$11,459	6.3		77,326	27.1	-157	0	248	722	83,217	72	171	360	PRESCRIPTIVE	$9,634	5.4
1b	Benjamin Franklin Elementary School	Lighting Controls	Y	$52,648	$1,849	($29)	$0	$0	$1,820	$0	$1,820	28.9		13,339	4.7	-28	0	43	125	14,346	12	29	62	PRESCRIPTIVE	$3,300	27.1
2a	Benjamin Franklin Elementary School	Energy Management System - Plant Equipment	Y	$34,978	$0	$4,456	$0	$0	$4,456	$0	$4,456	7.9		0	0.0	4,322	0	432	454	50,563	40	0	0		$0	7.9
2b	Benjamin Franklin Elementary School	Energy Management System - Terminal Equipment	Y	$201,259	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0		$0	0.0
3	Benjamin Franklin Elementary School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
5	Benjamin Franklin Elementary School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
9	Benjamin Franklin Elementary School	Pipe and Valve Insulation	Y	$13,340	$0	$2,204	$0	$0	$2,204	$0	$2,204	6.1		0	0.0	2,138	0	214	224	25,015	20	0	0			6.1
10	Benjamin Franklin Elementary School	Building Envelope Weatherization	Y	$42,895	$735	$2,483	$0	$0	$3,218	$0	$3,218	13.3		6,804	0.0	2,408	0	264	318	35,661	29	15	32		$0	13.3
12	Benjamin Franklin Elementary School	Plug Load Controls	Y	$13,132	$1,129	$0	$0	$0	$1,129	$0	$1,129	11.6		10,451	0.0	0	0	36	100	11,496	10	23	49	PRESCRIPTIVE	$1,080	10.7
13	Benjamin Franklin Elementary School	PC Power Management	Y	$2,381	$437	$0	$0	$0	$437	$0	$437	5.4		4,050	0.0	0	0	14	39	4,455	4	9	19		$0	5.4
14	Benjamin Franklin Elementary School	Solar PPA	Y	$0	$11,622	$0	($3,067)	$0	$8,555	$0	$8,555	0.0		0	0.0	0	0		1,028	118,371	102	238	500		$0	0.0
16	Benjamin Franklin Elementary School	eTemp Refrigeration Sensor	Y	$1,905	$410	$0	$0	$0	$410	$0	$410	4.6		3,795	0.0	0	0	13	36	4,175	4	8	18		$0	4.6
17	Benjamin Franklin Elementary School	Roof Upgrades	Y	$285,789	$73	$392	$0	$0	$465	$0	$465	614.7	#	676	0.0	380	0	40	46	5,191	4	1	3		$0	614.7
20	Benjamin Franklin Elementary School	Exhaust Fan Replacement	Y	$123,000	$2,138	$0	$0	$0	$2,138	$1,194	$3,332	36.9		15,705	5.1	0	0	54	150	17,275	15	35	73		$0	36.9
1a	James Madison Intermediate School	LED Tube Retrofit	Y	$70,301	$11,433	($202)	$0	$0	$11,231	$1,098	$12,329	5.7		77,149	27.0	-156	0	248	721	83,038	72	171	359	PRESCRIPTIVE	$10,052	4.9
1b	James Madison Intermediate School	Lighting Controls	Y	$35,762	$2,291	($42)	$0	$0	$2,249	$0	$2,249	15.9		15,438	5.5	-32	0	49	144	16,604	14	34	72	PRESCRIPTIVE	$2,275	14.9
2a	James Madison Intermediate School	Energy Management System - Plant Equipment	Y	$34,978	$0	$4,876	$0	$0	$4,876	$0	$4,876	7.2		0	0.0	3,766	0	377	395	44,057	35	0	0		$0	7.2
2b	James Madison Intermediate School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
5	James Madison Intermediate School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
9	James Madison Intermediate School	Pipe and Valve Insulation	Y	$14,868	$0	$3,331	$0	$0	$3,331	$0	$3,331	4.5		0	0.0	2,572	0	257	270	30,098	24	0	0			4.5
10	James Madison Intermediate School	Building Envelope Weatherization	Y	$49,483	$562	$2,217	$0	$0	$2,779	$0	$2,779	17.8		4,645	0.0	1,712	0	187	224	25,143	20	10	22		$0	17.8
11	James Madison Intermediate School	Water Conservation	Y	$5,976	$0	$323	$0	$1,660	$1,983	$0	$1,983	3.0		0	0.0	249	91,918	25	26	2,914	2	0	0			3.0
12	James Madison Intermediate School	Plug Load Controls	Y	$6,464	$845	$0	$0	$0	$845	$0	$845	7.6		6,987	0.0	0	0	24	67	7,686	7	15	32	PRESCRIPTIVE	$630	6.9
13	James Madison Intermediate School	PC Power Management	Y	$591	$243	$0	$0	$0	$243	$0	$243	2.4		2,009	0.0	0	0	7	19	2,210	2	4	9		$0	2.4
14	James Madison Intermediate School	Solar PPA	Y	$0	$46,899	$0	($11,046)	$0	$35,853	$0	$35,853	0.0		0	0.0	0	0		3,703	426,354	368	857	1,802		$0	0.0
16	James Madison Intermediate School	eTemp Refrigeration Sensor	Y	$1,905	$459	$0	$0	$0	$459	$0	$459	4.1		3,795	0.0	0	0	13	36	4,175	4	8	18		$0	4.1
17	James Madison Intermediate School	Roof Upgrades	Y	$311,965	$84	$525	$0	$0	$609	$0	$609	512.1	#	692	0.0	406	0	43	49	5,508	4	2	3		$0	512.1
20	James Madison Intermediate School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	James Madison Primary School	LED Tube Retrofit	Y	$67,761	$13,351	($173)	$0	$0	$13,178	$473	$13,651	5.0		72,645	25.2	-141	0	234	679	78,262	68	161	338	PRESCRIPTIVE	$9,226	4.3
1b	James Madison Primary School	Lighting Controls	Y	$35,467	$2,404	($34)	$0	$0	$2,370	$0	$2,370	15.0		13,041	4.6	-27	0	42	122	14,026	12	29	61	PRESCRIPTIVE	$2,700	13.8
2a	James Madison Primary School	Energy Management System - Plant Equipment	Y	$19,911	$0	$3,234	$0	$0	$3,234	$0	$3,234	6.2		0	0.0	2,630	0	263	276	30,767	24	0	0		$0	6.2
2b	James Madison Primary School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
5	James Madison Primary School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
0	James Madison Primary School	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	James Madison Primary School	Pipe and Valve Insulation	Y	$5,865	$0	$1,098	$0	$0	$1,098	$0	$1,098	5.3		0	0.0	892	0	89	94	10,441	8	0	0		$0	5.3
10	James Madison Primary School	Building Envelope Weatherization	Y	$56,910	$905	$2,410	$0	$0	$3,315	$0	$3,315	17.2		5,995	0.0	1,959	0	216	263	29,518	24	13	28		$0	17.2
11	James Madison Primary School	Water Conservation	Y	$6,022	$0	$322	$0	$1,704	$2,025	$0	$2,025	3.0		0	0.0	261	94,336	26	27	3,058	2	0	0		$0	3.0
12	James Madison Primary School	Plug Load Controls	Y	$6,738	$1,245	$0	$0	$0	$1,245	$0	$1,245	5.4		8,245	0.0	0	0	28	79	9,069	8	18	38	PRESCRIPTIVE	$735	4.8
13	James Madison Primary School	PC Power Management	Y	$1,684	$853	$0	$0	$0	$853	$0	$853	2.0		5,648	0.0	0	0	19	54	6,213	5	12	26		$0	2.0
14	James Madison Primary School	Solar PPA	Y	$0	$29,587	$0	($5,584)	$0	$24,003	$0	$24,003	0.0		0	0.0	0	0		1,872	215,535	186	433	911		$0	0.0
16	James Madison Primary School	eTemp Refrigeration Sensor	Y	$952	$313	$0	$0	$0	$313	$0	$313	3.0		2,070	0.0	0	0	7	20	2,277	2	5	10		$0	3.0
17	James Madison Primary School	Roof Upgrades	Y	$362,771	$129	$548	$0	$0	$677	$0	$677	535.9	#	857	0.0	445	0	47	55	6,150	5	2	4		$0	535.9
20	James Madison Primary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
2a	James Monroe Elementary School	Energy Management System - Plant Equipment	Y	$53,814	$0	$1,258	$0	$0	$1,258	$0	$1,258	42.8		0	0.0	793	0	79	83	9,276	7	0	0		$0	42.8
9	James Monroe Elementary School	Pipe and Valve Insulation	Y	$5,285	$0	$1,018	$0	$0	$1,018	$0	$1,018	5.2		0	0.0	642	0	64	67	7,508	6	0	0		$0	5.2
10	James Monroe Elementary School	Building Envelope Weatherization	Y	$50,790	$501	$2,875	$0	$0	$3,375	$0	$3,375	15.0		4,861	0.0	1,812	0	198	237	26,552	21	11	23		$0	15.0
11	James Monroe Elementary School	Water Conservation	Y	$7,593	$0	$298	$0	$895	$1,193	$0	$1,193	6.4		0	0.0	188	49,895	19	20	2,196	2	0	0		$0	6.4
12	James Monroe Elementary School	Plug Load Controls	Y	$6,602	$869	$0	$0	$0	$869	$0	$869	7.6		8,433	0.0	0	0	29	81	9,276	8	19	39	PRESCRIPTIVE	$735	6.8
13	James Monroe Elementary School	PC Power Management	Y	$1,715	$601	$0	$0	$0	$601	$0	$601	2.9		5,832	0.0	0	0	20	56	6,415	6	13	27		$0	2.9
14	James Monroe Elementary School	Solar PPA	Y	$0	$31,227	$0	($8,641)	$0	$22,586	$0	$22,586	0.0		0	0.0	0	0		2,897	333,513	288	670	1,410		$0	0.0
16	James Monroe Elementary School	eTemp Refrigeration Sensor	Y	$4,637	$1,729	$0	$0	$0	$1,729	$0	$1,729	2.7		16,790	0.0	0	0	57	160	18,469	16	37	78		$0	2.7
18	James Monroe Elementary School	Retrocommissioning	Y	$31,000	$2,339	$1,430	$0	$0	$3,769	$0	$3,769	8.2		22,714	0.0	901	0	168	312	35,532	30	50	106		$0	8.2
1a	John Marshall Elementary School	LED Tube Retrofit	Y	$102,660	$23,143	($233)	$0	$0	$22,910	$702	$23,612	4.3		106,456	37.5	-220	0	341	994	114,530	99	235	495	PRESCRIPTIVE	$13,091	3.8
1b	John Marshall Elementary School	Lighting Controls	Y	$50,823	$3,485	($36)	$0	$0	$3,450	$0	$3,450	14.7		16,027	5.7	-34	0	51	150	17,237	15	35	75	PRESCRIPTIVE	$3,350	13.8
2a	John Marshall Elementary School	Energy Management System - Plant Equipment	Y	$34,978	$0	$6,195	$0	$0	$6,195	$0	$6,195	5.6		0	0.0	5,844	0	584	614	68,376	54	0	0		$0	5.6
2b	John Marshall Elementary School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
3	John Marshall Elementary School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
5	John Marshall Elementary School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
7	John Marshall Elementary School	Unit Ventilator Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
8	John Marshall Elementary School	Addition of Cooling	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	John Marshall Elementary School	Pipe and Valve Insulation	Y	$19,637	$0	$3,491	$0	$0	$3,491	$0	$3,491	5.6		0	0.0	3,294	0	329	346	38,536	30	0	0		$0	5.6
10	John Marshall Elementary School	Building Envelope Weatherization	Y	$14,668	$398	$931	$0	$0	$1,329	$0	$1,329	11.0		2,127	0.0	878	0	95	113	12,615	10	5	10		$0	11.0
12	John Marshall Elementary School	Plug Load Controls	Y	$10,271	$1,543	$0	$0	$0	$1,543	$0	$1,543	6.7		8,252	0.0	0	0	28	79	9,077	8	18	38	PRESCRIPTIVE	$960	6.0
13	John Marshall Elementary School	PC Power Management	Y	$1,753	$1,115	$0	$0	$0	$1,115	$0	$1,115	1.6		5,962	0.0	0	0	20	57	6,558	6	13	28		$0	1.6
14	John Marshall Elementary School	Solar PPA	Y	$0	$50,398	$0	($7,681)	$0	$42,717	$0	$42,717	0.0		0	0.0	0	0		2,575	296,459	256	596	1,253		$0	0.0
16	John Marshall Elementary School	eTemp Refrigeration Sensor	Y	$1,905	$1,978	$0	$0	$0	$1,978	$0	$1,978	1.0		10,580	0.0	0	0	36	101	11,638	10	23	49		$0	1.0
17	John Marshall Elementary School	Roof Upgrades	Y	$391,479	$157	$586	$0	$0	$743	$6,527	$7,270	53.8	#	842	0.0	553	0	58	66	7,393	6	2	4		$0	53.8

EDISON TWP PUBLIC SCHOOLS			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of No_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	$	$	YEARS		kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
20	John Marshall Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Lincoln Elementary School	LED Tube Retrofit	Y	$64,284	$11,756	($163)	$0	$0	$11,593	$962	$12,555	5.1		72,311	25.3	-146	0	232	675	77,831	67	160	336	PRESCRIPTIVE	$8,900	4.4
1b	Lincoln Elementary School	Lighting Controls	Y	$40,123	$2,370	($34)	$0	$0	$2,336	$0	$2,336	17.2		14,558	5.1	-30	0	47	136	15,658	14	32	68	PRESCRIPTIVE	$2,450	16.1
2b	Lincoln Elementary School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
3	Lincoln Elementary School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
4	Lincoln Elementary School	Steam Trap Replacement	Y	$45,838	$0	$5,150	$0	$0	$5,150	$125	$5,275	8.7		0	0.0	4,631	0	463	486	54,185	43	0	0		$0	8.7
9	Lincoln Elementary School	Pipe and Valve Insulation	Y	$29,183	$0	$4,889	$0	$0	$4,889	$0	$4,889	6.0		0	0.0	4,397	0	440	462	51,440	40	0	0		$0	6.0
10	Lincoln Elementary School	Building Envelope Weatherization	Y	$46,542	$803	$2,674	$0	$0	$3,477	$0	$3,477	13.4		6,222	0.0	2,405	0	262	312	34,979	28	14	29		$0	13.4
11	Lincoln Elementary School	Water Conservation	Y	$41,412	$0	$512	$0	$5,369	$5,881	$0	$5,881	7.0		0	0	460	326,134	46	48	5,382	4	0	0		$0	7.0
12	Lincoln Elementary School	Plug Load Controls	Y	$9,764	$963	$0	$0	$0	$963	$0	$963	10.1		7,465	0.0	0	0	25	71	8,211	7	16	35	PRESCRIPTIVE	$900	9.2
13	Lincoln Elementary School	PC Power Management	Y	$6,158	$1,154	$0	$0	$0	$1,154	$0	$1,154	5.3		8,950	0.0	0	0	31	86	9,845	9	20	42		$0	5.3
14	Lincoln Elementary School	Solar PPA	Y	$0	$34,399	$0	($7,600)	$0	$26,799	$0	$26,799	0.0		0	0.0	0	0		2,548	293,325	253	589	1,240		$0	0.0
16	Lincoln Elementary School	eTemp Refrigeration Sensor	Y	$952	$223	$0	$0	$0	$223	$0	$223	4.3		1,725	0.0	0	0	6	16	1,898	2	4	8		$0	4.3
17	Lincoln Elementary School	Roof Upgrades	Y	$224,535	$66	$352	$0	$0	$418	$571	$989	227.0	#	515	0.0	316	0	33	38	4,267	3	1	2		$0	227.0
20	Lincoln Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Lindeneau Elementary School	LED Tube Retrofit	Y	$32,392	$6,506	($77)	$0	$0	$6,429	$1,032	$7,461	4.3		33,816	11.9	-71	0	108	316	36,370	31	75	157	PRESCRIPTIVE	$4,070	3.8
1b	Lindeneau Elementary School	Lighting Controls	Y	$17,218	$1,649	($19)	$0	$0	$1,630	$0	$1,630	10.6		8,571	3.0	-18	0	27	80	9,218	8	19	40	PRESCRIPTIVE	$750	10.1
2a	Lindeneau Elementary School	Energy Management System - Plant Equipment	Y	$34,978	$0	$2,682	$0	$0	$2,682	$0	$2,682	13.0		0	0.0	2,471	0	247	260	28,916	23	0	0		$0	13.0
2b	Lindeneau Elementary School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
3	Lindeneau Elementary School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
9	Lindeneau Elementary School	Pipe and Valve Insulation	Y	$10,666	$0	$1,770	$0	$0	$1,770	$0	$1,770	6.0		0	0.0	1,632	0	163	171	19,090	15	0	0		$0	6.0
10	Lindeneau Elementary School	Building Envelope Weatherization	Y	$14,084	$319	$724	$0	$0	$1,044	$0	$1,044	13.5		2,009	0.0	668	0	74	89	10,021	8	4	9		$0	13.5
12	Lindeneau Elementary School	Plug Load Controls	Y	$7,353	$835	$0	$0	$0	$835	$0	$835	8.8		5,252	0.0	0	0	18	50	5,777	5	12	24	PRESCRIPTIVE	$795	7.9
13	Lindeneau Elementary School	PC Power Management	Y	$3,777	$1,558	$0	$0	$0	$1,558	$0	$1,558	2.4		9,799	0.0	0	0	33	94	10,779	9	22	46		$0	2.4
14	Lindeneau Elementary School	Solar PPA	Y	$0	$17,297	$0	($3,100)	$0	$14,197	$0	$14,197	0.0		0	0.0	0	0		1,039	119,667	103	240	506		$0	0.0
16	Lindeneau Elementary School	eTemp Refrigeration Sensor	Y	$1,905	$658	$0	$0	$0	$658	$0	$658	2.9		4,140	0.0	0	0	14	40	4,554	4	9	19		$0	2.9
17	Lindeneau Elementary School	Roof Upgrades	Y	$470,172	$176	$633	$0	$0	$809	$0	$809	581.3	#	1,105	0.0	584	0	62	72	8,043	6	2	5		$0	581.3
20	Lindeneau Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Martin Luther King Elementary School	LED Tube Retrofit	Y	$93,968	$16,729	($200)	$0	$0	$16,528	$1,121	$17,649	5.3		91,082	31.3	-168	0	294	852	98,221	85	201	424	PRESCRIPTIVE	$12,250	4.6
1b	Martin Luther King Elementary School	Lighting Controls	Y	$52,938	$2,845	($38)	$0	$0	$2,807	$0	$2,807	18.9		15,229	5.4	-32	0	49	142	16,379	14	34	71	PRESCRIPTIVE	$2,775	17.9
2a	Martin Luther King Elementary School	Energy Management System - Plant Equipment	Y	$34,978	$0	$4,554	$0	$0	$4,554	$0	$4,554	7.7		0	0.0	3,827	0	383	402	44,775	35	0	0		$0	7.7
2b	Martin Luther King Elementary School	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
3	Martin Luther King Elementary School	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
6	Martin Luther King Elementary School	Rooftop Unit Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
0	Martin Luther King Elementary School	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	Martin Luther King Elementary School	Pipe and Valve Insulation	Y	$9,752	$0	$1,945	$0	$0	$1,945	$0	$1,945	5.0		0	0.0	1,635	0	163	172	19,128	15	0	0		$0	5.0
10	Martin Luther King Elementary School	Building Envelope Weatherization	Y	$36,318	$703	$1,927	$0	$0	$2,629	$0	$2,629	13.8		4,420	0.0	1,619	0	177	212	23,803	19	10	21		$0	13.8
11	Martin Luther King Elementary School	Water Conservation	Y	$6,761	$0	$361	$0	$1,025	$1,386	$0	$1,386	4.9		0	0.0	304	57,251	30	32	3,551	3	0	0		$0	4.9
12	Martin Luther King Elementary School	Plug Load Controls	Y	$6,824	$1,065	$0	$0	$0	$1,065	$0	$1,065	6.4		6,698	0.0	0	0	23	64	7,368	6	15	31	PRESCRIPTIVE	$630	5.8
13	Martin Luther King Elementary School	PC Power Management	Y	$3,709	$777	$0	$0	$0	$777	$0	$777	4.8		4,886	0.0	0	0	17	47	5,375	5	11	23		$0	4.8
14	Martin Luther King Elementary School	Solar PPA	Y	$0	$26,504	$0	($4,751)	$0	$21,753	$0	$21,753	0.0		0	0.0	0	0		1,592	183,359	158	368	775		$0	0.0
16	Martin Luther King Elementary School	eTemp Refrigeration Sensor	Y	$2,782	$878	$0	$0	$0	$878	$0	$878	3.2		5,520	0.0	0	0	19	53	6,072	5	12	26		$0	3.2
17	Martin Luther King Elementary School	Roof Upgrades	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0	#	0	0.0	0	0	0	0	0	0	0	0			0.0
20	Martin Luther King Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Washington Elementary School	LED Tube Retrofit	Y	$80,748	$14,721	($215)	$0	$0	$14,505	$1,421	$15,926	5.1		90,351	31.8	-185	0	290	844	97,217	84	200	420	PRESCRIPTIVE	$10,920	4.4
1b	Washington Elementary School	Lighting Controls	Y	$45,083	$2,815	($42)	$0	$0	$2,773	$0	$2,773	16.3		17,259	6.1	-36	0	55	161	18,562	16	38	80	PRESCRIPTIVE	$2,600	15.3
2a	Washington Elementary School	Energy Management System - Plant Equipment	Y	$34,978	$0	$5,641	$0	$0	$5,641	$0	$5,641	6.2		0	0.0	4,854	0	485	510	56,797	45	0	0		$0	6.2
2b	Washington Elementary School	Energy Management System - Terminal Equipment	Y	$233,546	$904	$421	$0	$0	$1,325	$0	$1,325	176.2		7,352	0.0	362	0	61	108	12,327	10	16	34		$0	176.2
3	Washington Elementary School	Boiler Replacement	Y	$602,700	$0	$5,109	$0	$0	$5,109	$293	$5,402	111.6		0	0.0	4,397	0	440	462	51,443	40	0	0	PRESCRIPTIVE	$21,231	107.6
4	Washington Elementary School	Steam Trap Replacement	Y	$30,982	$0	$2,843	$0	$0	$2,843	$98	$2,941	10.5		0	0.0	2,447	0	245	257	28,628	23	0	0		$0	10.5
6	Washington Elementary School	Rooftop Unit Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
7	Washington Elementary School	Unit Ventilator Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
8	Washington Elementary School	Addition of Cooling	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
9	Washington Elementary School	Pipe and Valve Insulation	Y	$18,040	$0	$2,293	$0	$0	$2,293	$0	$2,293	7.9		0	0.0	1,973	0	197	207	23,087	18	0	0		$0	7.9
10	Washington Elementary School	Building Envelope Weatherization	Y	$67,632	$762	$2,529	$0	$0	$3,291	$0	$3,291	20.5		6,199	0.0	2,176	0	239	288	32,280	26	14	29		$0	20.5
11	Washington Elementary School	Water Conservation	Y	$10,031	$0	$360	$0	$1,249	$1,609	$0	$1,609	6.2		0	0.0	310	121,338	31	33	3,623	3	0	0		$0	6.2
12	Washington Elementary School	Plug Load Controls	Y	$8,415	$1,181	$0	$0	$0	$1,181	$0	$1,181	7.1		9,603	0.0	0	0	33	92	10,564	9	21	45	PRESCRIPTIVE	$825	6.4
13	Washington Elementary School	PC Power Management	Y	$2,855	$1,019	$0	$0	$0	$1,019	$0	$1,019	2.8		8,288	0.0	0	0	28	79	9,117	8	18	39		$0	2.8
14	Washington Elementary School	Solar PPA	Y	$0	$26,075	$0	($6,042)	$0	$20,033	$0	$20,033	0.0		0	0.0	0	0		2,025	233,193	201	469	986		$0	0.0
16	Washington Elementary School	eTemp Refrigeration Sensor	Y	$1,905	$467	$0	$0	$0	$467	$0	$467	4.1		3,795	0.0	0	0	13	36	4,175	4	8	18		$0	4.1
17	Washington Elementary School	Roof Upgrades	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
19	Washington Elementary School	Asbestos Abatement	Y	$120,000	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0		$0	0.0
20	Washington Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Woodbrook Elementary School	LED Tube Retrofit	Y	$82,931	$15,490	($352)	$0	$0	$15,138	$1,239	$16,377	5.1		93,221	32.8	-192	0	299	870	100,300	87	206	433	PRESCRIPTIVE	$11,300	4.4
1b	Woodbrook Elementary School	Lighting Controls	Y	$79,054	$4,053	($94)	$0	$0	$3,960	$0	$3,960	20.0		24,375	8.6	-51	0	78	228	26,217	23	54	113	PRESCRIPTIVE	$4,650	18.8
2a	Woodbrook Elementary School	Energy Management System - Plant Equipment	Y	$53,814	$0	$9,622	$0	$0	$9,622	$0	$9,622	5.6		0	0.0	5,234	0	523	550	61,241	48	0	0		$0	5.6
5	Woodbrook Elementary School	Variable Frequency Drives on HW Pumps	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
9	Woodbrook Elementary School	Pipe and Valve Insulation	Y	$18,079	$0	$5,429	$0	$0	$5,429	$0	$5,429	3.3		0	0.0	2,953	0	295	310	34,554	27	0	0		$0	3.3
10	Woodbrook Elementary School	Building Envelope Weatherization	Y	$65,035	$1,072	$5,435	$0	$0	$6,506	$0	$6,506	10.0		7,947	0.0	2,957	0	323	386	43,334	35	18	37		$0	10.0
11	Woodbrook Elementary School	Water Conservation	Y	$8,541	$0	$884	$0	$2,287	$3,171	$0	$3,171	2.7		0	0.0	481	122,429	48	50	5,624	4	0	0		$0	2.7
12	Woodbrook Elementary School	Plug Load Controls	Y	$16,588	$1,700	$0	$0	$0	$1,700	$0	$1,700	9.8		12,609	0.0	0	0	43	120	13,870	12	28	59	PRESCRIPTIVE	$1,515	8.9
13	Woodbrook Elementary School	PC Power Management	Y	$21,323	$774	$0	$0	$0	$774	$0	$774	27.5		5,741	0.0	0	0	20	55	6,315	5	13	27		$0	27.5
14	Woodbrook Elementary School	Solar PPA	Y	$0	$50,642	$0	($10,704)	$0	$39,938	$0	$39,938	0.0		0	0.0	0	0		3,588	413,136	357	830	1,746		$0	0.0
16	Woodbrook Elementary School	eTemp Refrigeration Sensor	Y	$6,491	$2,310	$0	$0	$0	$2,310	$0	$2,310	2.8		17,135	0.0	0	0	58	164	18,849	16	38	80		$0	2.8
17	Woodbrook Elementary School	Roof Upgrades	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0	#	0	0.0	0	0	0	0	0	0	0	0			0.0
20	Woodbrook Elementary School	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	FDR Round Building	LED Tube Retrofit	Y	$2,991	$383	$0	$0	$0	$383	$986	$1,369	2.2		2,979	1.2	0	0	10	28	3,276	3	7	14	PRESCRIPTIVE	$368	1.9
1b	FDR Round Building	Lighting Controls	Y	$12,798	$611	$0	$0	$0	$611	$0	$611	20.9		4,560	2.2	0	0	16	44	5,016	4	10	21	PRESCRIPTIVE	$975	19.3
2b	FDR Round Building	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
7	FDR Round Building	Unit Ventilator Replacement	Y	$386,250	$771	$0	$0	$0	$771	$293	$1,064	362.9		8,041	0.0	0	0	27	77	8,845	8	18	37		$0	362.9
8	FDR Round Building	Addition of Cooling	Y	$321,875	($3,514)	$0	$0	$0	($3,514)	$0	($3,514)	-91.6		-15,197	-25.8	0	0	-52	-145	-16,717	-14	-34	-71		$0	0.0

EDISON TWP PUBLIC SCHOOLS			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of No_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	$	$	YEARS		kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
10	FDR Round Building	Building Envelope Weatherization	Y	$27,039	$3,132	$0	$0	$0	$3,132	$0	$3,132	8.6		32,646	0.0	0	0	111	312	35,910	31	72	152		$0	8.6
11	FDR Round Building	Water Conservation	Y	$4,242	$189	$0	$0	$470	$659	$0	$659	6.4		1,974	0.0	0	26,029	7	19	2,172	2	4	9		$0	6.4
12	FDR Round Building	Plug Load Controls	Y	$2,736	$115	$0	$0	$0	$115	$0	$115	23.8		1,197	0.0	0	0	4	11	1,317	1	3	6	PRESCRIPTIVE	$315	21.1
13	FDR Round Building	PC Power Management	Y	$229	$75	$0	$0	$0	$75	$0	$75	3.1		778	0.0	0	0	3	7	855	1	2	4		$0	3.1
14	FDR Round Building	Solar PPA	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0		0	0	0	0	0			0.0
17	FDR Round Building	Roof Upgrades	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0	#	0	0.0	0	0	0	0	0	0	0	0			0.0
20	FDR Round Building	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Edison Early Learning Center	LED Tube Retrofit	Y	$16,119	$2,223	($29)	$0	$0	$2,194	$630	$2,824	5.7		11,942	4.2	-25	0	38	111	12,844	11	26	56	PRESCRIPTIVE	$1,416	5.2
1b	Edison Early Learning Center	Lighting Controls	Y	$7,300	$410	($5)	$0	$0	$405	$0	$405	18.0		2,204	0.8	-5	0	7	21	2,370	2	5	10	PRESCRIPTIVE	$425	17.0
2b	Edison Early Learning Center	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
3	Edison Early Learning Center	Boiler Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
6	Edison Early Learning Center	Rooftop Unit Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0	PRESCRIPTIVE		0.0
7	Edison Early Learning Center	Unit Ventilator Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
10	Edison Early Learning Center	Building Envelope Weatherization	Y	$5,375	$112	$314	$0	$0	$426	$0	$426	12.6		720	0.0	270	0	29	35	3,953	3	2	3		$0	12.6
12	Edison Early Learning Center	Plug Load Controls	Y	$659	$104	$0	$0	$0	$104	$0	$104	6.3		673	0.0	0	0	2	6	740	1	1	3	PRESCRIPTIVE	$75	5.6
13	Edison Early Learning Center	PC Power Management	Y	$210	$111	$0	$0	$0	$111	$0	$111	1.9		713	0.0	0	0	2	7	784	1	2	3		$0	1.9
14	Edison Early Learning Center	Solar PPA	Y	$0	$9,476	$0	($1,741)	$0	$7,736	$0	$7,736	0.0		0	0.0	0	0		584	67,191	58	135	284		$0	0.0
17	Edison Early Learning Center	Roof Upgrades	Y	$114,725	$31	$141	$0	$0	$172	$2,086	$2,258	50.8	#	203	0.0	121	0	13	15	1,638	1	0	1		$0	50.8
20	Edison Early Learning Center	Exhaust Fan Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0		0	0.0	0	0	0	0	0	0	0	0			0.0
1a	Edison Education Center	LED Tube Retrofit	Y	$136,018	$6,187	($117)	$0	$0	$6,070	$2,949	$9,019	15.1		38,792	13.7	-81	0	124	362	41,729	36	86	180	PRESCRIPTIVE	$19,475	12.9
1b	Edison Education Center	Lighting Controls	Y	$48,584	$1,375	($26)	$0	$0	$1,349	$0	$1,349	36.0		8,617	3.0	-18	0	28	80	9,267	8	19	40	PRESCRIPTIVE	$3,625	33.3
2b	Edison Education Center	Energy Management System - Terminal Equipment	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
6	Edison Education Center	Rooftop Unit Replacement	Y	$496,908	$7,245	$2,561	$0	$0	$9,806	$1,972	$11,779	42.2		44,497	17.1	1,767	0	329	611	69,626	59	98	207	PRESCRIPTIVE	$7,475	41.6
0	Edison Education Center	AHU / Split System Replacement	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0	0	0	0	0	0	0			0.0
10	Edison Education Center	Building Envelope Weatherization	Y	$10,130	$170	$764	$0	$0	$934	$0	$934	10.8		1,380	0.0	527	0	57	69	7,686	6	3	6		$0	10.8
11	Edison Education Center	Water Conservation	Y	$5,121	$0	$170	$0	$746	$915	$0	$915	5.6		0	0.0	117	41,628	12	12	1,369	1	0	0		$0	5.6
12	Edison Education Center	Plug Load Controls	Y	$2,909	$556	$0	$0	$0	$556	$0	$556	5.2		4,518	0.0	0	0	15	43	4,969	4	10	21	PRESCRIPTIVE	$345	4.6
13	Edison Education Center	PC Power Management	Y	$3,711	$929	$0	$0	$0	$929	$0	$929	4.0		7,541	0.0	0	0	26	72	8,295	7	17	35		$0	4.0
14	Edison Education Center	Solar PPA	Y	$0	$19,652	$0	($4,548)	$0	$15,104	$0	$15,104	0.0		0	0.0	0	0		1,525	175,534	152	353	742		$0	0.0
17	Edison Education Center	Roof Upgrades	Y	$529,000	$139	$995	$0	$0	$1,135	$0	$1,135	466.2	#	1,131	0.0	687	0	73	83	9,281	7	3	5		$0	466.2
1a	Building and Grounds	LED Tube Retrofit	Y	$8,568	$1,535	($20)	$0	$0	$1,515	$150	$1,665	5.1		9,704	3.6	-19	0	31	91	10,450	9	21	45	PRESCRIPTIVE	$1,208	4.4
1b	Building and Grounds	Lighting Controls	Y	$2,412	$64	($1)	$0	$0	$63	$0	$63	38.2		403	0.2	-1	0	1	4	432	0	1	2	PRESCRIPTIVE	$150	35.8
10	Building and Grounds	Building Envelope Weatherization	Y	$3,662	$54	$174	$0	$0	$228	$0	$228	16.0		444	0.0	169	0	18	22	2,463	2	1	2		$0	16.0
11	Building and Grounds	Water Conservation	Y	$4,032	$0	$15	$0	$53	$68	$0	$68	59.3		0	0.0	15	2,964	1	2	171	0	0	0		$0	59.3
12	Building and Grounds	Plug Load Controls	Y	$133	$6	$0	$0	$0	$6	$0	$6	24.1		45	0.0	0	0	0	0	50	0	0	0	PRESCRIPTIVE	$15	21.4
13	Building and Grounds	PC Power Management	Y	$76	$32	$0	$0	$0	$32	$0	$32	2.4		259	0.0	0	0	1	2	285	0	1	1		$0	2.4
14	Building and Grounds	Solar PPA	N	$0	$0	$0	$0	$0	$0	$0	$0	0.0		0	0.0	0	0		0	0	0	0	0			0.0
		TOTALS		$19,942,863	$1,551,937	$259,126	($191,067)	$42,165	$1,662,161	$82,724	$1,744,885	11.4		3,336,043	823.9	214,508	2,451,888	32,833	118,443	13,577,037	11,497	22,003	46,126		$407,184	11.2

ECMs evaluated but NOT included

EDISON TWP PUBLIC SCHOOLS			INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of No_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	$	$	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
20	Edison High School	Exhaust Fan Replacement	$92,250	$0	$0	$0	$0	$0	$896	$896	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
20	John P. Stevens High School	Exhaust Fan Replacement	$102,500	$0	$0	$0	$0	$0	$995	$995	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
5	Herbert Hoover Middle School	Variable Frequency Drives on HW Pumps	$32,136	$3,147	$0	$0	$0	$3,147	$0	$3,147	10.2	23,220	1.4	0	0	79	222	25,542	22	51	108	PRESCRIPTIVE	$3,500	9.1
6	Herbert Hoover Middle School	Rooftop Unit Replacement	$67,666	$1,692	$917	$0	$0	$2,608	$621	$3,229	21.0	7,711	7.7	696	0	96	147	16,625	14	17	36	PRESCRIPTIVE	$1,850	20.4
0	Herbert Hoover Middle School	AHU / Split System Replacement	$95,172	$82	$0	$0	$0	$82	$0	$82	1,155.6	338	0.4	0	0	1	3	372	0	1	2		$0	1155.6
20	Herbert Hoover Middle School	Exhaust Fan Replacement	$41,000	$40	$0	$0	$0	$40	$398	$438	93.6	308	0.0	0	0	1	3	339	0	1	1		$0	93.6
3	John Adams Middle School	Boiler Replacement	$1,033,200	$0	$9,901	$0	$0	$9,901	$641	$10,542	98.0	0	0.0	8,056	0	806	846	94,256	74	0	0	PRESCRIPTIVE	$21,000	96.0
5	John Adams Middle School	Variable Frequency Drives on HW Pumps	$32,136	$2,786	$0	$0	$0	$2,786	$0	$2,786	11.5	23,220	1.4	0	0	79	222	25,542	22	51	108	PRESCRIPTIVE	$3,500	10.3
0	John Adams Middle School	AHU / Split System Replacement	$46,968	$103	$0	$0	$0	$103	$0	$103	456.1	770	0.2	0	0	3	7	847	1	2	4			456.1
20	John Adams Middle School	Exhaust Fan Replacement	$61,500	$0	$0	$0	$0	$0	$597	$597	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
3	Thomas Jefferson Middle School	Boiler Replacement	$1,033,200	$0	$7,884	$0	$0	$7,884	$846	$8,730	118.3	0	0.0	7,452	0	745	782	87,187	69	0	0	PRESCRIPTIVE	$21,000	115.9
5	Thomas Jefferson Middle School	Variable Frequency Drives on HW Pumps	$44,496	$2,403	$0	$0	$0	$2,403	$0	$2,403	18.5	23,220	1.4	0	0	79	222	25,542	22	51	108	PRESCRIPTIVE	$3,000	17.3
7	Thomas Jefferson Middle School	Unit Ventilator Replacement	$1,596,500	$3,257	$0	$0	$0	$3,257	$0	$3,257	490.2	33,234	0.0	0	0	113	318	36,558	32	73	155		$0	490.2
8	Thomas Jefferson Middle School	Addition of Cooling	$684,950	($16,769)	$0	$0	$0	($16,769)	$0	($16,769)	-40.8	-74,294	-106.8	0	0	-253	-710	-81,723	-71	-164	-345		$0	0.0
20	Thomas Jefferson Middle School	Exhaust Fan Replacement	$97,375	$0	$0	$0	$0	$0	$945	$945	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
0	Woodrow Wilson Middle School	AHU / Split System Replacement	$113,712	$53	$0	$0	$0	$53	$764	$817	139.2	273	0.4	0	0	1	3	300	0	1	1		$0	139.2
20	Woodrow Wilson Middle School	Exhaust Fan Replacement	$128,125	$0	$0	$0	$0	$0	$1,244	$1,244	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
3	Benjamin Franklin Elementary School	Boiler Replacement	$910,200	$0	$3,678	$0	$0	$3,678	$818	$4,496	202.5	0	0.0	3,567	0	357	375	41,733	33	0	0	PRESCRIPTIVE	$24,500	197.0
5	Benjamin Franklin Elementary School	Variable Frequency Drives on HW Pumps	$29,046	$878	$0	$0	$0	$878	$0	$878	33.1	7,740	0.5	0	0	26	74	8,514	7	17	36	PRESCRIPTIVE	$1,600	31.3
2b	James Madison Intermediate School	Energy Management System - Terminal Equipment	$227,842	$0	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0		$0	0.0
5	James Madison Intermediate School	Variable Frequency Drives on HW Pumps	$29,664	$1,461	$0	$0	$0	$1,461	$0	$1,461	20.3	11,610	0.7	0	0	40	111	12,771	11	26	54	PRESCRIPTIVE	$2,300	18.7
20	James Madison Intermediate School	Exhaust Fan Replacement	$123,000	$0	$0	$0	$0	$0	$1,194	$1,194	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	James Madison Primary School	Energy Management System - Terminal Equipment	$81,795	$485	$0	$0	$0	$485	$0	$485	168.5	3,214	0.0	0	0	11	31	3,536	3	7	15		$0	168.5
5	James Madison Primary School	Variable Frequency Drives on HW Pumps	$29,664	$1,821	$0	$0	$0	$1,821	$0	$1,821	16.3	11,610	0.7	0	0	40	111	12,771	11	26	54	PRESCRIPTIVE	$2,300	15.0
0	James Madison Primary School	AHU / Split System Replacement	$118,038	$285	$0	$0	$0	$285	$519	$804	146.7	1,502	0.6	0	0	5	14	1,652	1	3	7		$0	146.7
20	James Madison Primary School	Exhaust Fan Replacement	$112,750	$41	$0	$0	$0	$41	$1,095	$1,136	99.3	272	0.0	0	0	1	3	300	0	1	1		$0	99.3
2b	John Marshall Elementary School	Energy Management System - Terminal Equipment	$455,254	$609	$576	$0	$0	$1,185	$0	$1,185	384.0	3,258	0.0	544	0	65	88	9,944	8	7	15		$0	384.0
3	John Marshall Elementary School	Boiler Replacement	$774,900	$0	$7,491	$0	$0	$7,491	$982	$8,473	91.5	0	0.0	7,067	0	707	742	82,688	65	0	0	PRESCRIPTIVE	$7,000	90.6
5	John Marshall Elementary School	Variable Frequency Drives on HW Pumps	$29,046	$1,489	$0	$0	$0	$1,489	$0	$1,489	19.5	7,740	0.5	0	0	26	74	8,514	7	17	36	PRESCRIPTIVE	$1,600	18.4
7	John Marshall Elementary School	Unit Ventilator Replacement	$927,000	$3,609	$0	$0	$0	$3,609	$0	$3,609	256.9	19,297	0.0	0	0	66	184	21,227	18	43	90		$0	256.9
8	John Marshall Elementary School	Addition of Cooling	$432,600	($12,175)	$0	$0	$0	($12,175)	$0	($12,175)	-35.5	-36,473	-62.0	0	0	-124	-348	-40,120	-35	-81	-170		$0	0.0
20	John Marshall Elementary School	Exhaust Fan Replacement	$82,000	$0	$0	$0	$0	$0	$796	$796	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	Lincoln Elementary School	Energy Management System - Terminal Equipment	$29,060	$896	$96	$0	$0	$991	$0	$991	29.3	6,943	0.0	86	0	32	75	8,645	7	15	32		$0	29.3
3	Lincoln Elementary School	Boiler Replacement	$602,700	$0	$3,778	$0	$0	$3,778	$374	$4,152	145.1	0	0.0	3,398	0	340	357	39,752	31	0	0	PRESCRIPTIVE	$21,231	140.0
20	Lincoln Elementary School	Exhaust Fan Replacement	$71,750	$0	$0	$0	$0	$0	$697	$697	103.0	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	Lindeneau Elementary School	Energy Management System - Terminal Equipment	$183,501	$0	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0		$0	0.0
3	Lindeneau Elementary School	Boiler Replacement	$774,900	$0	$592	$0	$0	$592	$805	$1,397	554.5	0	0.0	546	0	55	57	6,389	5	0	0	PRESCRIPTIVE	$7,000	549.5
20	Lindeneau Elementary School	Exhaust Fan Replacement	$10,250	$0	$0	$0	$0	$0	$100	$100	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	Martin Luther King Elementary School	Energy Management System - Terminal Equipment	$224,936	$349	$0	$0	$0	$349	$0	$349	644.5	2,195	0.0	0	0	7	21	2,414	2	5	10		$0	644.5
3	Martin Luther King Elementary School	Boiler Replacement	$861,000	$0	$3,659	$0	$0	$3,659	$228	$3,887	221.5	0	0.0	3,075	0	307	323	35,976	28	0	0	PRESCRIPTIVE	$10,500	218.8
6	Martin Luther King Elementary School	Rooftop Unit Replacement	$32,722	$1,018	$0	$0	$0	$1,018	$0	$1,018	32.1	6,007	1.1	0	0	20	57	6,608	6	13	28	PRESCRIPTIVE	$625	31.5
0	Martin Luther King Elementary School	AHU / Split System Replacement	$80,340	$162	$0	$0	$0	$162	$0	$162	494.5	900	0.3	0	0	3	9	990	1	2	4		$0	494.5
17	Martin Luther King Elementary School	Roof Upgrades	$0	$0	$0	$0	$0	$0	$1,567	$1,567	0.0	# 0	0.0	0	0	0	0	0	0	0	0		$0	0.0
20	Martin Luther King Elementary School	Exhaust Fan Replacement	$35,875	$0	$0	$0	$0	$0	$348	$348	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
6	Washington Elementary School	Rooftop Unit Replacement	$79,712	$467	$544	$0	$0	$1,011	$0	$1,011	78.9	1,776	2.2	468	0	53	66	7,427	6	4	8	PRESCRIPTIVE	$1,700	77.2
7	Washington Elementary School	Unit Ventilator Replacement	$669,500	$1,714	$0	$0	$0	$1,714	$0	$1,714	390.6	13,937	0.0	0	0	48	133	15,331	13	31	65		$0	390.6
8	Washington Elementary School	Addition of Cooling	$432,600	($11,531)	$0	$0	$0	($11,531)	$0	($11,531)	-37.5	-36,473	-62.0	0	0	-124	-348	-40,120	-35	-81	-170		$0	0.0
17	Washington Elementary School	Roof Upgrades	$0	$0	$0	$0	$0	$0	$0	$0	0	0	0.0	0	0	0	0	0	0	0	0		$0	0.0
20	Washington Elementary School	Exhaust Fan Replacement	$143,500	$0	$0	$0	$0	$0	$1,393	$1,393	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
5	Woodbrook Elementary School	Variable Frequency Drives on HW Pumps	$29,046	$1,086	$0	$0	$0	$1,086	$0	$1,086	26.7	7,740	0.5	0	0	26	74	8,514	7	17	36	PRESCRIPTIVE	$1,600	25.3
17	Woodbrook Elementary School	Roof Upgrades	$0	$61	$492	$0	$0	$553	$0	$553	0.0	# 453	0.0	268	0	28	32	3,629	3	1	2		$0	0.0
20	Woodbrook Elementary School	Exhaust Fan Replacement	$92,250	$0	$0	$0	$0	$0	$896	$896	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	FDR Round Building	Energy Management System - Terminal Equipment	$106,872	$982	$0	$0	$0	$982	$0	$982	108.9	10,232	0.0	0	0	35	98	11,256	10	23	48		$0	108.9
14	FDR Round Building	Solar PPA	$0	$0	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0		0	0	0	0	0		$0	0.0
17	FDR Round Building	Roof Upgrades	$189,575	$38	$0	$0	$0	$38	$0	$38	5,007.8	# 395	0.0	0	0	1	4	434	0	1	2		$0	5007.8
20	FDR Round Building	Exhaust Fan Replacement	$20,500	$0	$0	$0	$0	$0	$199	$199	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	Edison Early Learning Center	Energy Management System - Terminal Equipment	$27,445	$682	$184	$0	$0	$866	$0	$866	31.7	4,396	0.0	158	0	31	59	6,688	6	10	20		$0	31.7
3	Edison Early Learning Center	Boiler Replacement	$167,280	$0	$1,012	$0	$0	$1,012	$42	$1,054	158.8	0	0.0	870	0	87	91	10,175	8	0	0	PRESCRIPTIVE	$1,700	157.1
6	Edison Early Learning Center	Rooftop Unit Replacement	$36,194	$392	$382	$0	$0	$774	$0	$774	46.7	1,574	1.7	328	0	38	50	5,573	5	3	7	PRESCRIPTIVE	$625	45.9
7	Edison Early Learning Center	Unit Ventilator Replacement	$199,614	$220	$0	$0	$0	$220	$0	$220	907.4	824	1.1	0	0	3	8	906	1	2	4		$0	907.4
20	Edison Early Learning Center	Exhaust Fan Replacement	$51,250	$0	$0	$0	$0	$0	$498	$498	103	0	0.0	0	0	0	0	0	0	0	0		$0	103.0
2b	Edison Education Center	Energy Management System - Terminal Equipment	$110,854	$1,394	$1,154	$0	$0	$2,547	$0	$2,547	43.5	11,318	0.0	796	0	118	192	21,764	18	25	53		$0	43.5
0	Edison Education Center	AHU / Split System Replacement	$28,119	$24	$0	$0	$0	$24	$112	$136	206.9	97	0.1	0	0	0	1	107	0	0	0		$0	206.9
14	Building and Grounds	Solar PPA	$0	$5,085	$0	($1,183)	$0	$3,902	$0	$3,902	0.0	0	0.0	0	0		397	45,671	39	92	193		$0	0.0
		TOTALS	$14,957,029	($1,663)	$42,339	($1,183)	$0	$39,493	$20,609	$60,102	248.9	100,084	-207.9	37,374	0	4,079	5,277	692,723	1,031	1,550	3,091		$138,131	246.6

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

APPENDIX G – ENERGY SAVINGS SUPPLEMENTAL INFORMATION

Additional information in submission folder.

EDISON TOWNSHIP PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

APPENDIX H – LOCAL GOVERNMENT ENERGY AUDITS

See attached Local Government Energy Audits in submission folder.