Town of Rochester, Massachusetts

Energy Reduction Plan

Prepared by the Southeastern Regional Planning and Economic Development District (SRPEDD) with support from the Town of Rochester

In Fulfillment of the
Massachusetts Green Communities Grant Program
Criterion #3

November 2019

Table of Contents

I. Purpose and Acknowledgements

A. Letter from the General Government Verifying Adoption of the Energy Reduction Plan

Town of Rochester
Board of Selectmen
1 Constitution Way, Rochester MA 02770
Phone: 508-763-3871 Fax: 508-763-4892
www.townofrochestermass.com

Board of Selectmen
Paul Ciaburri, Chairman
Bradford N. Morse, Vice Chairman
Greenwood Hartley III, Clerk

Town Administrator
Suzanne E. Szyndlar
Administrative Assistant
Amanda L. Baptiste

October 21st, 2019

Massachusetts Department of Energy Resources
Green Communities Division
100 Cambridge Street, Suite 1040
Boston, MA 02114

RE: ROCHESTER – Adoption of Energy Reduction Plan for Criterion 3

To Whom It May Concern:

Please be advised that on October 21st, 2019, the Board of Selectmen of the Town of Rochester met at a duly noticed and regularly scheduled meeting and voted to adopt the Energy Reduction Plan for Criterion 3 of the Green Communities Application for Designation. The Board of Selectmen was given copies of the plan for review prior to the meeting.

The Board of Selectmen voted unanimously to adopt the plan and the minutes of the October 21st, 2019 meeting reflect said vote.

Sincerely,

Paul Ciaburri, Chairman

Bradford Morse, Vice Chairman

Greenwood Hartley III, Clerk

B. Letter from the School District Verifying Adoption/Approval of the Energy Reduction Plan

OLD ROCHESTER REGIONAL SCHOOL DISTRICT
MASSACHUSETTS SCHOOL SUPERINTENDENCY UNION #55
Marion - Mattapoisett - Rochester
135 Marion Road, Mattapoisett, MA 02739

Phone: 508-758-2772
Fax: 508-758-2802

Douglas R. White Jr., Ed. D.
Superintendent of Schools

Michael S. Nelson, M.Ed.
Director of Student Services

www.oldrochester.org

October 23, 2019

Massachusetts Department of Energy Resources
Green Communities Division
100 Cambridge Street, Suite 1040
Boston, MA 02114

To Whom It May Concern:

Please be advised that the Rochester Public Schools adopts the Energy Reduction Plan as part of the Town of Rochester's Green Communities Application for Designation.

Sincerely,

Douglas R. White, Jr. Ed.D.
Superintendent of Schools

C. List of Contributors

The collaborative efforts of the Rochester Board of Selectmen, the Rochester Memorial School Committee, Rochester Environmental Planner/Conservation Agent Laurell J. Farinon, Rochester Facilities Manager Andrew Daniel, and former MA Department of Energy Resources Green Community Regional Coordinator Seth Pickering were all vital in the production this Plan.

Much of the information in this Plan was derived from energy audits performed by RISE Engineering, led by Frank C. Davey. Additional technical assistance was provided by the Southeastern Regional Planning and Economic Development District (SRPEDD), the author of this Plan.

II. Executive Summary

A. Narrative Summary of the Town

The Town of Rochester is located in southeastern Massachusetts in southern Plymouth County. It is located 60 miles south of Boston, 40 miles east of Providence, Rhode Island, and 10 miles east of New Bedford. The town has an approximate area of 36.4 square miles and is bordered by Lakeville and Middleborough on the north; Wareham and Marion on the east; Mattapoisett on the south; and Acushnet and Freetown on the west. According to the 2010 U.S. Census, Rochester had a population of 5,232, having experienced a 14.2% increase in population since 2000.

Rochester was founded in 1679 along the coast of Buzzard's Bay. Officially incorporated in 1686, Rochester originally included the lands of Mattapoisett, Marion and parts of Wareham. The town originally thrived with the early shipbuilding and whaling trade in Mattapoisett Harbor. However, in 1852 and 1857 the town of Marion and Mattapoisett, respectively, were separated and incorporated as separate towns, thus land-locking Rochester. Since that time, the town has become a rural-residential community, with farms dotting the town's landscape.

Today, Rochester can be described as a desirable bedroom community for nearby New Bedford. Rochester's population has grown steadily since the 1970s as large amounts of open space have been developed for housing. Rochester is accessible to the larger southeastern Massachusetts region via nearby Interstates 195 and 495, as well as Routes 18, 28, and 105.

B. Summary of Municipal Energy Uses

- Total Number of Municipal Buildings: 10
- Total Number of Municipal Vehicles: 42
- Total Number of Street Lights: 0
- Total Number of Traffic Lights: 0

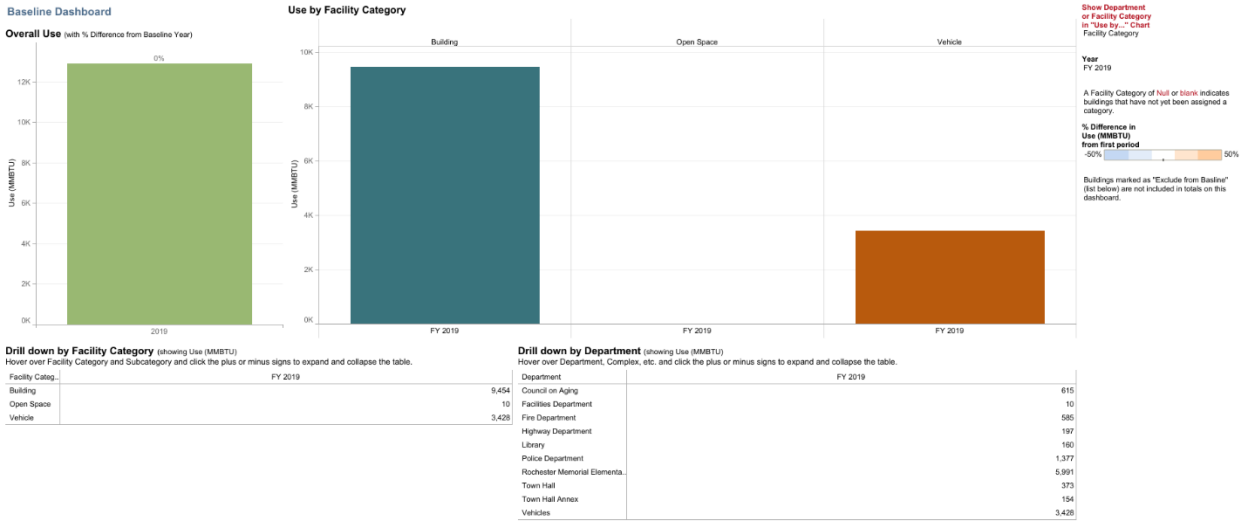
Table 1: Municipal Energy Use Summary

	Number	Ownership
Buildings	**10**	
Oil Heat	4	Municipality
Natural Gas Heat	5	Municipality
Propane Heat	0	
Biomass Heat	0	
Electricity	0	
Other Type Heat	1	Municipality
Vehicles	**42**	
Non-Exempt	3	Municipality
Exempt	39	Municipality
Street Lights	0	
Traffic Lights	0	

C. Summary of Energy Use Baseline and Plans for Reductions

This Energy Reduction Plan commits Rochester to reduce energy use in municipal facilities by at least 20% compared to Fiscal Year 2019 over five years. In the baseline year, the town used 12,892 MMBTUs of energy, which means the town must reduce usage by at least 2,578 MMBTUs over the following five-year period.

Figure 1: Municipal Energy Use Baseline Dashboard from MEI (FY2019)



Rochester has identified energy savings measures in each facility category to reduce energy use 20% based on the total baseline usage, as illustrated in Table 2.

Table 2: Summary of Municipal Energy Use and Reductions

Facility Category	MMBTU Used in Baseline Year	% of Total MMBtu Baseline Energy Consumption	Projected Planned MMBtu Savings	Savings as % of Total MMBtu Baseline Energy Consumption
Buildings	9,454	73.3%	2,294	17.8%
Vehicles	3,428	26.6%	0	0.0%
Open Space	10	0.1%	7	0.1%
Total	**12,892**	**100%**	**2,301**	**17.9%**

III. Energy Use Baseline Inventory

A. Identification of the Inventory Tool Used: The Town of Rochester used the Department of Energy Resources (DOER) MassEnergyInsight (MEI) web-based energy inventory and analysis tool.

B. Identification of the Baseline Year: Fiscal Year (FY) 2019 will serve as the baseline year. FY2019 ran from July 1, 2018 to June 30, 2019. This will give the Town until June 30, 2024 (FY2020 - FY2024) to reach its 20% energy reduction goal.

C. Municipal Energy Consumption for the Baseline Year (FY2019): In the baseline year, the town used 12,892 MMBTUs of energy. Table 3 and 4 presents energy use for each municipal facility in MMBTUs and native units.

- Buildings: Rochester's 10 buildings used 9,454 MMBTUs, approximately 73% of Rochester's total municipal energy use. The buildings with the largest energy use are the Rochester Memorial School (2,099 MMBTUs) and the Police Station (1,377 MMBTUs), as shown in Figure 2.

- Vehicles: Rochester's 42 municipal vehicles use 26.6% of the baseline total, or 3,428 MMBTUs.

- Open Space: Rochester's open space facilities consume just 10 MMBTUs, or 0.1% of the town's energy use.

Table 3: Municipal Energy Consumption for Baseline Year FY2019 (MMBTU)

ERP Guidance Table 3b - Municipal Energy Consumption for 2019 (MMBTU)

Please make sure that any data submitted to DOER contains complete Data!

		2019						
		Diesel	Electric	Gas	Gasoline	Oil	Propane	Total
Building	Rochester Memorial Elementa..		2,099			3,893		**5,991**
	Town Hall		198	175				**373**
	Library		58	20		82		**160**
	Town Hall Annex		52	102				**154**
	Council on Aging		269	346				**615**
	Police Station		456	921				**1,377**
	Fire Station #1		93			406		**500**
	Fire Station #2		11			75		**86**
	Highway Department - Fire St..		105				59	**164**
	Old Highway Barn		33					**33**
	Total		**3,374**	**1,565**		**4,456**	**59**	**9,454**
Open Space	Gifford Park		0					**0**
	Dexter Lane Ballfields		10					**10**
	Total		**10**					**10**
Vehicle	Vehicles	998			2,430			**3,428**
	Total	**998**			**2,430**			**3,428**
Grand Total		**998**	**3,384**	**1,565**	**2,430**	**4,456**	**59**	**12,892**

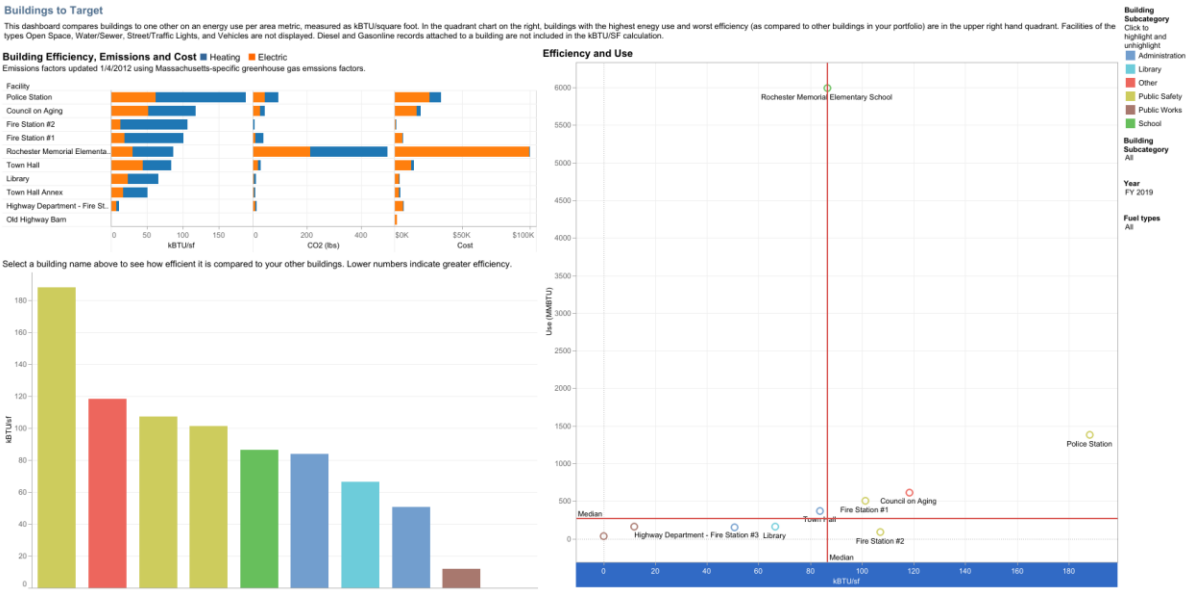
Table 4: Municipal Energy Consumption for Baseline Year FY2019 (Native Fuel Units)

ERP Guidance Table 3a - Municipal Energy Consumption for 2019 (Native Fuel Units)

		2019					
		Electric (kWh)	Gas (therms)	Oil (gallons)	Gasoline (gallons)	Diesel (gallons)	Propane (gallons)
Building	Rochester Memorial Elementa..	615,071		28,004			
	Town Hall	57,963	1,749				
	Library	17,008	199	591			
	Town Hall Annex	15,224	1,023				
	Council on Aging	78,912	3,462				
	Police Station	133,560	9,214				
	Fire Station #1	27,339		2,924			
	Fire Station #2	3,142		540			
	Highway Department - Fire St..	30,809					650
	Old Highway Barn	9,739					
	Total	**988,767**	**15,647**	**32,059**			**650**
Open Space	Gifford Park	47					
	Dexter Lane Ballfields	2,938					
	Total	**2,985**					
Vehicle	Vehicles				19,593	7,183	
	Total				**19,593**	**7,183**	
Grand Total		**991,752**	**15,647**	**32,059**	**19,593**	**7,183**	**650**

Figure 2: MEIs Buildings to Target Dashboard

In Figure 2 below, the points further to the right have a higher energy use per square foot (i.e. less energy efficient), while the points higher up use more total energy. The Rochester Memorial School, for example, uses the most energy of any building in Rochester.



IV. Energy Reduction Plan

A. Narrative Summary

As shown below, the town has identified energy savings measures to reduce usage from FY2019 by 2,301 MMBTUs or 17.9%. It is important to note that schedule below can be modified to accommodate the changing goals and priorities of the community and that projects outside the scope of this Energy Reduction Plan may be eligible for grant funding as long as they are in a building that is listed in this Plan.

1. Overview of Plan Goals Year 1:

- **Police Department**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

- **Highway Department/Fire Department #3**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

2. Overview of Plan Goals Years 1-2:

- **Council on Aging**
  Pre-Rinse Spray Valve: Replace the existing pre-rinse spray valve in the kitchen with a new high efficiency (low-flow) pre-rinse spray valve with an average flow rate of 1.6 GPM. The Massachusetts Technical Reference Manual (TRM 2019-2021) states a deemed savings value of 11.4 MMBtu per unit replaced.

- **Fire Department #2**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

- **Town Hall**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior

metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

3. Overview of Plan Goals Years 1-3:

- **Council on Aging**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

- **Fire Department #1**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

  Pipe Insulation: Install pipe insulation on bare heating hot water and domestic hot water piping in the mechanical space of the police station. There is 5' of 2.5" diameter HHW pipe at 180°F for the heating season as well as 20' of both 0.75" and 1" diameter DHW piping at 120°F year round. We are recommending installing 1.5" thick insulation on the HHW pipe and 1" on the DHW pipe. (45' of piping in total – Savings were determined using heat loss values produced by the 3EPlus V4 program)

- **Fire Department #2**
  Weatherization: The following weatherization measures are included:
  - Attic access: Install weather-stripping and two layers of Thermax Rigid insulation (R-26) to the attic access hatch. Some carpentry will be required to allow hatch cover to properly fit which is included in the cost.
  - Air sealing: Seal 300 square feet of 2 x 6 tongue and groove surfaces in the rear attic space to reduce heat loss via thermal by-pass and air infiltration/exfiltration. High quality foams, caulks, and other materials will be used to seal sources of air leakage.
  - Rear attic-Install R-38 Cellulose insulation to 300 square feet of un-insulated attic space.
  - Door weather-stripping: Install weather-stripping and sweeps as applicable to one entry door.
  - Overhead Door weather-stripping: Replace the existing damaged and non-effective weather-stripping on the overhead door.

- **Highway Department/Fire Department #3**
  Weatherization:
  - Highway Barn: Install door weather-stripping and sweeps as applicable to 4 entry doors and replace the existing damaged and non-effective weather-stripping on the 8 overhead doors.

- Fire Station #3: Install weather-stripping and sweep as applicable to 1 entry door and replace the existing damaged and non-effective weather-stripping on the 4 overhead doors.

- **Town Hall**

  Weatherization: The following air sealing and insulation measures are included:

  - Air sealing:
    - Seal 1,356 square feet of plaster and lathe open attic flats, slopes and knee-walls.
    - Seal 1,400 square feet of open attic space.
    - Seal perimeter and penetrations in the 950 square feet asphalt flat roof within the rear and side attic spaces.
    - Chases, plumbing and wiring penetrations, access openings and other leakage points will be sealed to reduce heat loss via thermal by-pass and air infiltration/exfiltration using high quality foams, caulks, and other materials will be used to seal sources of air leakage.

  - Insulation:
    - Slopes-Install R-38 Fiberglass insulation to 200 sqaure feet of un-insulated sloped areas.
    - Knee-wall areas-Install R-13 fiberglass plus 2" rigid insulation board to total R-26 to 350 square feet of un-insulated knee-wall areas.
    - Common wall area-Install R-13 (nominal) Cellulose insulation to 185 square feet of the wall that is common to the office and attic. The insulation is installed by drilling 2" holes in the surface from the attic side, holes will be plugged and one coat of compound applied.
    - Open attic areas-Install R-38 Cellulose insulation to 3,012 sqaure feet of un-insulated open attic areas.
    - Perimeter Insulation-Install R-30 Batt insulation to 172 sqaure feet of un-insulated perimeter under the rear and side original flat roof areas. This will be completed from below by removing and re-installing ceiling tiles.

  - Door weather-stripping: Install weather-stripping and sweeps as applicable to 1 double door and 2 single doors.

  - Window panels: The windows in the office that is common to an open attic have single pane sashes. These can be improved by installing an interior glass panel to the 3 windows.

- **Rochester Memorial School**

  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

Boiler Room ECM Pumps and VFDs: Replace existing low efficiency standard pumps with new high efficiency pumps with ECM motors, integrated sensors and VFD. This will save energy through the high efficiency motors and also slowing the pump down as the system requires.

Main Heating Pumps - ECM Upgrades: Replace existing low efficiency standard pumps with new high efficiency pumps with ECM motors, integrated sensors and VFD. This will save energy through the high efficiency motors and also slowing the pump down as the system requires.

ECM Exhaust Fans & Regulators: Replace old inefficient exhaust fans with new exhaust fans with ECM motors and speed controls. Furnish and install air regulating dampers in exhaust ducts to control the volume of exhaust to specifications. This will save energy first through the high efficiency motor savings and also reduce the amount of air being exhausted from the building which needs to be heated.

Refrigeration ECM Motors and Controls: Replace existing standard motors in the walk in cooler evaporator fans with new high efficiency ECM motors. Install 2-speed controls to slow the fans down when the compressors are not calling. This will save energy through the ECM motors and also the speed controls will further increase savings.

Kitchen Hood Controls: install kitchen exhaust fan controls on the kitchen hood. Kitchen hood controls monitor cooking activity, measure effluence, and automatically adjust the exhaust fan speed accordingly. The kitchen hood has no controls, when the fans are on, they run at full load. This measure would install controls to the kitchen hood to reduce the time the exhaust fan is running at full load.

High Efficiency Transformer Upgrades: Replace existing transformers with new higher efficiency transformers. The existing transformers are TP-1 rated which is 2002 technology. In 2016 the DOE adopted a higher standard of efficiency known as DOE-2016. Upgrading the transformers will provide incremental energy savings to current code requirements.

Door Weather-stripping: Replace the weather-stripping on 22 exterior doors, specifically:

- 5 single aluminum doors weather-strip the frame, and install sweeps.
- 16 double aluminum doors replace the existing damaged/ non-effective bulb/ pile and astragal pile weather-stripping, and install new sweeps.
- 1 single steel door weather-strip the frame and install a new sweep.
- Seal the frame around 2 roll-up garage doors using one part foam and/ or caulk.

Replacement of Skylights: Replace the 2- 72”x72” existing domed skylights with newer energy saving skylights (U-0.33). The new non-operating skylights would feature:

- Extruded aluminum, mill finish exterior frame.
- Extruded white PVC interior frame.
- Double glazed acrylic dome with “Satin Sky 2” exterior to reduce solar heat gain (0.31) o
- A final interior, Lumira aerogel filled multiwall polycarbonate panel.

Air Sealing: There are gaps causing air leakage at the wall to roof connection around the perimeter of the building. There are four different ages of construction and each would be treated differently.

- The original 1950's construction- front of building to the right of the main entrance: There is R-30 fiberglass placed in the wood roof frame. There is no blocking at the front and rear. Seal the perimeter joist cavities where the roof framing sits on the exterior wall using 1" rigid fiberglass (r-5) and sealing it in using one part foam. LF to be treated: 582
- 1970's construction- rear-right of the original building including the connector between the courtyards: There is a corrugated steel roof deck that is not sealed. Seal the perimeter open cavities of the corrugated deck using one part foam. Drill ¾" holes in the lower surface of the corrugated deck to fill the perimeter of the deck using one part foam. LF to be treated: 464
- 1980's construction- front main entrance, gym and cafeteria, rear of left courtyard, and front-far right: Seal the 1 "nominal gaps on the sections where the roof deck connects with the top of the exterior walls. Lineal footage: 1184 (656 lf of the total will require a lift inside to reach the ceiling, this cost is included). There is an open cavity at the front entry that is open to the front exterior overhang. Cut and fit 2" rigid Thermax insulation board (r-13) to block this cavity. Seal in place using one part foam. 102 sf
- 2000's construction- left of the gym/ cafeteria: Seal the 1 "nominal gaps on the sections where the drywall was cut and fit at the roof perimeter. Seal the open CMU block cores at the top of the exterior walls. Lineal footage: 166

Exterior Caulking: There is deteriorating caulk on the exterior at the expansion joints as well as around windows and doors.

- Remove the existing deteriorated caulking and install new urethane caulk and backer rod as needed to up to 1660 lf.

4. Overview of Plan Goals Years 2-3:

- **Council on Aging**

  Pressure Barrier: There is currently no pressure barrier below the existing R-30 fiberglass batt insulation that is installed in the attic framing above the suspended ceiling tiles.
  - To create an effective pressure barrier, the existing insulation must be removed and a rigid fiberglass board is installed and sealed in place using one-part foam. The original insulation is then re-installed on the new pressure barrier.
  - The total square footage to be treated: 4,869 sq. ft.

  Door weather-stripping: Install weather-stripping and sweep as applicable to the attic entry door.

- **Public Library**

  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

5. Overview of Plan Goals Years 2-4:

- **Police Department**
  Condensing Boiler: Replace the (2) Burnham 400,000 Btu/hr, 80% efficiency boilers with two new Lochinvar Armor high efficiency condensing boiler rated at 400,000 Btu/hr and 98% efficiency each.

  Pipe Insulation: Install fiberglass pipe insulation with ASJ jacketing to 26 linear feet of exposed 1-1/4 and 1" copper domestic hot water pipes and install open cell foam pipe insulation to 8 linear feet of exposed copper domestic hot water pipes.

6. Overview of Plan Goals Years 3-4:

- **Fire Department #1**
  Weatherization: The following weatherization measures are included:
  - Attic access: Install weather-stripping and two layers of Thermax Rigid insulation (R-26) to the 3' x 7' attic access hatch. Create two temporary accesses through the sheetrock ceilings in the left side offices and third garage bay.
  - Air sealing: Seal 1,887 square feet of open attic spaces, knee-walls, chases, plumbing and wiring penetrations, access openings and other leakage points to reduce heat loss via thermal by-pass and air infiltration/exfiltration. These areas are the front, left lower attic over the offices, rear attic below the 3' platform, and 3rd garage bay. High quality foams, caulks, and other materials will be used to seal sources of air leakage.
  - Pressure Barrier: There is currently no effective pressure barrier above the 1st and 2nd garage bays due to the condition of the original plaster and lathe ceiling. To create an effective pressure barrier, a rigid fiberglass board is installed and sealed in place using one part foam. The total square footage to be treated is 925 square feet.
  - Insulation: Front-left attic-Install R-30 Cellulose insulation to 444 square feet of existing R-13. 1st, 2nd, 3rd garage bays-Install R-38 Cellulose insulation to 1,443 square feet of uninsulated attic flats.
  - Door weather-stripping: Install weather-stripping and sweeps as applicable to 2 entry doors.
  - Overhead Door weather-stripping: Replace the existing damaged and non-effective weatherstripping on the 4 overhead doors.

- **Police Department**
  EMC Pumps with VFDs: Replace existing low efficiency standard pumps with new high efficiency pumps with ECM motors, integrated sensors and VFD. This will save energy through the high efficiency motors and also slowing the pump down as the system requires.

- **Public Library**
  Condensing Furnace: Replace (1) Existing 120,000 Btu Oil Furnace, 5-Ton ACoil and 5-Ton Condensing Unit Split System and (1) Existing 80,000Btu Gas Furnace, 3-Ton ACoil and 3-Ton Condensing Unit Split System with (1) new Carrier 97% Efficiency 120,000Btu Gas Furnace, (1) new Carrier 5-Ton A-Coil and (1) New Carrier 5- Ton Condensing Unit, (1) new Carrier 97% Efficiency 80,000Btu Gas Furnace, and (1) new Carrier 3-Ton A-Coil and one (1) New Carrier 3- Ton Condensing Unit.

Weatherization: The following weatherization measures are included:

- Attic access: Install weather-stripping and two layers of Thermax Rigid insulation (R-26) to the attic access hatch.
- Air Sealing: Seal 440 square feet of hard ceiling surfaces in the front attic spaces, knee-walls, chases, plumbing and wiring penetrations, access openings and other leakage points including basement areas to reduce heat loss via thermal by-pass and air infiltration/exfiltration. This includes covering IC rated recessed light cans. High quality foams, caulks, and other materials will be used to seal sources of air leakage.
- Pressure Barrier: There is currently no pressure barrier below the existing R-19 fiberglass batt insulation that is installed in the attic framing above the suspended ceiling tiles. To create an effective pressure barrier, the existing insulation must be removed and a rigid fiberglass board is installed and sealed in place using one-part foam. The original insulation is then re-installed on the new pressure barrier. The total square footage to be treated is 1,902 square feet.
- Insulation: Install R-13 Cellulose insulation to 440 square feet of existing R-30. In the front attic. Install R-19 Fiberglass insulation to 1,442 square feet of existing R-19 in the main attic. This does not include the catwalk areas that are already filled to capacity. Install R-19 Batt insulation to 200 square feet of un-insulated sills at the foundation perimeter. Install R-30 Batt insulation to 1,902 square feet of un-insulated basement ceiling.
- Duct sealing: Seal exposed ducts in the basement to reduce heat loss via thermal by-pass and air infiltration/exfiltration. High quality mastics and other materials will be used to seal sources of air leakage. Some ducts have existing deteriorated insulation. This will be removed to allow sealing and new insulation to be installed.
- Duct Insulation: Furnish and install R-8 FSK fiberglass insulation to 1,000 square feet of uninsulated ducts in the attic.
- Door weather-stripping: Install weather-stripping and sweep as applicable to the basement entry door.
- Pipe insulation: Install open cell foam insulation to 100 linear feet of exposed ¾ copper domestic hot water pipes.

7. Overview of Plan Goals Years 4-5:

- **Council on Aging**

  Condensing Water Heater: Replace the existing Rheem 300,000 Btu/hr, 80% efficiency water heater with a new Lochinvar Armor high efficiency condensing boiler rated at 285,000 Btu/hr and 98% efficiency.

  Kitchen Hood Controls: Install kitchen exhaust fan controls on the kitchen hood. Kitchen hood controls monitor cooking activity, measure effluence, and automatically adjust the exhaust fan speed accordingly. The kitchen hood currently has no controls and when the fans are on, they run at full load. Installing controls to the kitchen hood would reduce the time the exhaust fan is running at full load.

- **Town Hall Annex**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

  Condensing Furnace: Replace the existing 85% efficient furnace with a new high efficiency condensing furnace (97% efficient). The Massachusetts Technical Reference Manual (TRM 2019-2021) states a deemed savings value of 6.7 MMBtu and 168 kWh. See baseline and proposed cases in the image below from the TRM.

8. Overview of Plan Goals Year 5:

- **Dexter Lane Ballfield**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

- **Gifford Park**
  LED Lighting Upgrades & Controls: Replace all existing fluorescent luminaires with new LED troffers, wraps, vapor tights, or in some cases LED line voltage lamps bypassing and removing the ballasts. Lutron lighting controls will be installed where applicable to provide automatic on/off switching based on occupant motion and manual dimming controls for occupant comfort. Exterior metal halide and high pressure sodium lighting will be replaced with new LED wall packs, floods, and pole lighting.

B. Path to 20% Energy Use Reduction by the end of Fiscal Year 2024

1. Program Management Plan for Implementation, Monitoring, and Oversight

The Town Administrator's Office, in collaboration with Environmental Planner/Conservation Agent Laurell J. Farinon and Facilities Manager Andrew Daniel, will be responsible both for oversight of the Energy Reduction Plan and for implementation of energy conservation measures within the Town. The Town Administrator's Office also in collaboration with Environmental Planner/Conservation Agent Laurell J. Farinon and Facilities Manager Andrew Daniel will also be responsible for the annual reporting requirements to maintain designation and eligibility for annual competitive grant funding.

2. Summary of Energy Audit(s) or Other Sources for Projected Energy Savings

Building audits were provided by RISE Engineering in 2019 and provide 17.9% energy savings. The RISE Engineering Audit is included in Appendix A. There are also a number of fleet management strategies that the town can adopt to reduce their municipal energy use. In Rochester, vehicle fuel accounts for almost 27% of the town's total energy usage. By implementing the fleet management strategies noted below, the town reduce their vehicle fuel usage.

- Maintaining appropriate air pressure in vehicle tires, can decrease a vehicle's fuel consumption by 4%[1]. This strategy could save the town an additional 784 gallons of gas and 287 gallons of diesel annually based on the town's FY2019 usage.
- Using synthetic oil in all vehicles can reduce fuel consumption by 2% as well as decrease the number of annual oil changes and associated labor costs[2]. This strategy could save the town an additional 392 gallons of gas and 144 gallons of diesel annually based on FY2019 usage.

3. Energy Conservation Measures

Table 4 lists recommended energy conservation measures. References for each measure are included in the table and these references are included as appendices to the Energy Reduction Plan. Projected annual MMBTU savings for each category (buildings, vehicles, etc.) are subtotaled to arrive at a municipal grand total.

[1] http://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf
[2] http://www.fueleconomy.gov/feg/pdfs/OwnerRelatedFuelEconomyImprovements.pdf

Criterion 3 Step 4: Complete Table 4 - ECMs

Click here to view a sample version of this table

Table 4
Energy Conservation Measures Data

ECMs			Status		Energy Data						Financial Data					Reference Data	
Building/Site Name	Energy Conservation Measure Name	ECM Type (select one from drop-down)	Status (select one from drop-down)	Status Date (Completed with month/year or planned month/year)	Projected Annual Electricity Savings (kWh)	Projected Annual Natural Gas Savings (therms)	Projected Annual Oil Savings (gallons)	Projected Annual Propane Savings (gallons)	Projected Annual Gasoline Savings (gallons)	Projected Annual Diesel Savings (gallons)	Projected Annual Cost Savings ($)	Total Installed Cost ($)	Green Community Grant ($)	Utility Incentives ($)	Net Cost ($)	Funding Source(s) for Net Costs	Source for Projected Savings
Council on Aging	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1-3	26,544	0	0	0	0	0	$5,580	$29,827		$6,636	$23,191		RISE Engineering Audit
Council on Aging	Condensing Water Heater	Hot Water	Planned	Years 4-5	0	432	0	0	0	0	$476	$20,768		$0	$20,768		RISE Engineering Audit
Council on Aging	Kitchen Hood Controls	HVAC	Planned	Years 4-5	0	370	0	0	0	0	$407	$19,564		$0	$19,564		RISE Engineering Audit
Council on Aging	Air Sealing	Weatherization	Planned	Years 2-3	0	224	0	0	0	0	$246	$28,280		$0	$28,280		RISE Engineering Audit
Council on Aging	Pre-Rinse Spray Valve	Hot Water	Planned	Years 1-2	0	114	0	0	0	0	$125	$110		$50	$60		RISE Engineering Audit
Fire Department #1	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1-3	5,937	0	0	0	0	0	$1,341	$9,387		$1,484	$7,903		RISE Engineering Audit
Fire Department #1	Envelope Insulation	Weatherization	Planned	Years 3-4	0	0	152	0	0	0	$232	$4,257		$422	$3,835		RISE Engineering Audit
Fire Department #1	Air Sealing	Weatherization	Planned	Years 3-4	0	0	214	0	0	0	$327	$11,230		$594	$10,636		RISE Engineering Audit
Fire Department #1	Pipe Insulation	Hot Water	Planned	Years 1-3	0	0	432	0	0	0	$660	$4,956		$1,200	$3,756		RISE Engineering Audit
Fire Department #2	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1-2	579	0	0	0	0	0	$160	$1,243		$145	$1,098		RISE Engineering Audit
Fire Department #2	Envelope Insulation	Weatherization	Planned	Years 1-3	0	54	0	0	0	0	$59	$860		$108	$752		RISE Engineering Audit
Fire Department #2	Air Sealing	Weatherization	Planned	Years 1-3	0	70	0	0	0	0	$77	$1,855		$140	$1,715		RISE Engineering Audit
Police Department	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1	38,559	0	0	0	0	0	$7,959	$30,177		$9,640	$20,537		RISE Engineering Audit
Police Department	Condensing Boiler	Hot Water	Planned	Years 2-4	0	1,028	0	0	0	0	$1,131	$42,126		$8,000	$34,126		RISE Engineering Audit
Police Department	Pipe Insulation	Weatherization	Planned	Years 2-4	0	105	0	0	0	0	$116	$453		$210	$243		RISE Engineering Audit
Police Department	ECM Pumps with VFDs	Pump/Motor/Drive	Planned	Years 3-4	2,473	0	0	0	0	0	$510	$21,600		$618	$20,982		RISE Engineering Audit
Highway Barn/Fire Department #3	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1	18,957	0	0	0	0	0	$4,205	$33,704		$4,739	$28,965		RISE Engineering Audit
Highway Barn/Fire Department #3	Air Sealing	Weatherization	Planned	Years 1-3	0	0	0	149	0	0	$149	$15,505		$0	$15,505		RISE Engineering Audit
Town Hall	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 1-2	11,807	0	0	0	0	0	$2,551	$19,931		$2,952	$16,979		RISE Engineering Audit
Town Hall	Envelope Insulation	Weatherization	Planned	Years 1-3	0	129	0	0	0	0	$142	$11,419		$0	$11,419		RISE Engineering Audit
Town Hall	Air Sealing	Weatherization	Planned	Years 1-3	555	452	0	0	0	0	$617	$8,235		$1,043	$7,192		RISE Engineering Audit
Town Hall Annex	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 4-5	8,902	0	0	0	0	0	$2,018	$13,966		$2,226	$11,741		RISE Engineering Audit
Town Hall Annex	Condensing Furnace	Hot Water	Planned	Years 4-5	168	67	0	0	0	0	$112	$19,317		$600	$18,717		RISE Engineering Audit
Public Library	LED Lighting Upgrades & Controls	Interior Lighting	Planned	Years 2-3	10,673	0	0	0	0	0	$2,419	$14,659		$2,668	$11,991		RISE Engineering Audit
Public Library	Envelope Insulation	Weatherization	Planned	Years 3-4	0	315	0	0	0	0	$347	$12,779		$0	$12,779		RISE Engineering Audit
Public Library	Condesning Furnace	Hot Water	Planned	Years 3-4	0	134	0	0	0	0	$147	$28,674		$1,200	$27,474		RISE Engineering Audit
Public Library	Duct Insulation	Weatherization	Planned	Years 3-4	0	130	0	0	0	0	$143	$7,087		$0	$7,087		RISE Engineering Audit
Public Library	Air Sealing	Weatherization	Planned	Years 3-4	0	108	0	0	0	0	$119	$14,769		$0	$14,769		RISE Engineering Audit
Dexter Lane Ballfield	LED Lighting Upgrades & Controls	Exterior Lighting	Planned	Years 5	836	0	0	0	0	0	$237	$1,915		$209	$1,706		RISE Engineering Audit
Gifford Park	LED Lighting Upgrades & Controls	Exterior Lighting	Planned	Years 5	1,027	0	0	0	0	0	$291	$3,037		$257	$2,780		RISE Engineering Audit
Rochester Memorial School	LED Lighting Upgrades & Controls-1st Floor	Interior Lighting	Planned	Years 1-3	99,278	0	0	0	0	0	$19,915	$94,080		$24,820	$69,261		RISE Engineering Audit
Rochester Memorial School	LED Lighting Upgrades & Controls-2nd Floor, Exterior & Gym	Interior Lighting	Planned	Years 1-3	28,941	0	0	0	0	0	$5,806	$44,210		$7,235	$36,975		RISE Engineering Audit
Rochester Memorial School	Boiler Room ECM Pumps and VFDs	Pump/Motor/Drive	Planned	Years 1-3	7,120	596	0	0	0	0	$2,084	$42,900		$2,972	$39,928		RISE Engineering Audit
Rochester Memorial School	Main Heating Pumps - ECM Upgrades	Pump/Motor/Drive	Planned	Years 1-3	1,436	596	0	0	0	0	$944	$72,000		$1,551	$70,449		RISE Engineering Audit
Rochester Memorial School	ECM Exhaust Fans and Regulators	HVAC	Planned	Years 1-3	20,777	0	0	0	0	0	$4,168	$62,400		$5,194	$57,206		RISE Engineering Audit
Rochester Memorial School	Refrigeration ECM Motors and Controls	Refrigeration	Planned	Years 1-3	5,666	0	0	0	0	0	$1,137	$6,000		$1,417	$4,584		RISE Engineering Audit
Rochester Memorial School	Kitchen Exhaust Hood Controls	HVAC	Planned	Years 1-3	15,270	0	0	0	0	0	$3,063	$22,000		$3,818	$18,183		RISE Engineering Audit
Rochester Memorial School	High Efficiency Transformer Upgrades	Other	Planned	Years 1-3	29,325	0	0	0	0	0	$5,883	$40,400		$7,331	$33,069		RISE Engineering Audit
Rochester Memorial School	Door Weatherstripping	Weatherization	Planned	Years 1-3	877	974	0	0	0	0	$1,247	$12,028		$2,167	$9,861		RISE Engineering Audit
Rochester Memorial School	Replacement of Skylights	Weatherization	Planned	Years 1-3	6	6	0	0	0	0	$8	$5,570		$0	$5,570		RISE Engineering Audit
Rochester Memorial School	Air Sealing & Exterior Caulking	Weatherization	Planned		2,158	4,334	0	0			$5,200	$68,231		$9,208	$59,024		RISE Engineering Audit
				Years 5	**337,871**	**10,238**	**798**	**149**	**0**	**0**	**82,358**	**901,509**	**0**	**110,854**	**790,660**		
		TOTAL MMBtu SAVINGS	**2,301**		**1152.815852**	**1023.8**	**110.922**	**13.559**	**0**	**0**							

C. Summary of Long-Term Energy Reduction Goals – Beyond 5 Years

1. Municipal Buildings (including schools)

To better strategize for the long-term maintenance and management of municipal buildings, Rochester will work with internal schools and town staff as well as outside consultants, when necessary, to assess and document the condition of major municipal buildings on an annual basis. In addition to exposing continuing opportunities for energy use reductions, this effort will provide the Town with a clear, long-term asset management strategy for the effective budgeting and maintenance of buildings.

2. Vehicles (including schools)

The Fuel-Efficient Vehicle policy will have become engrained within municipal purchasing practices after five years, and the Town will seek to explore even more efficient policies and tracking systems to enable more efficiency.

3. Perpetuating Energy Efficiency

Ongoing dialogue with Town and School staff can tap into the knowledge of the employees who use and maintain the buildings every day. It can empower building staff to develop a detailed repair and management schedule and collect data on problems and inefficiencies that may be missed by traditional third party audits. The use of a web-based application system like SeeClickFix would create additional real-time opportunities for efficiencies in operation and maintenance.

The Town of Rochester will grow its capacity to retrofit and build more efficient facilities, purchase more efficient vehicles, and illuminate the Town through more efficient lighting throughout the 5-year period. These practices will become more engrained in the culture of the Town and will provide opportunities to instill the ethos into additional policies and programs for more dedicated long-term funding streams and strategies.

V: Appendix A: Building Energy Audits – RISE Engineering

(Please see attached report)

Town of Rochester, MA

Green Communities Energy Efficiency Report

Overview of Report

RISE Engineering conducted an energy efficiency assessment of the town owned buildings located in Rochester, Massachusetts. The purpose of the audits was to identify energy conservation opportunities.

By: RISE Engineering

Contents

Facility / Project Location			
Town of Rochester Green Communities Application Rochester, Massachusetts			
RISE Engineering			
Frank Davey	Manager, Special Projects	RISE Engineering	(401) 301-0769 FDavey@RISEengineering.com
Jean-Paul Vandeputte	Director of Engineering	RISE Engineering	(401) 784-3700 Ext 6129 JPVandeputte@RISEengineering.com
Shane Murphy	Energy Engineer	RISE Engineering	(401) 603-6485 SMurphy@RISEEngineering.com
Site Contact			
Andrew Daniels	Director of Facilities	Town of Rochester	(774) 929-0321 adaniel@townofrochester.com

Executive Summary

The purpose of this report is to summarize the existing points of energy use, highlight any issues with regard to elevated energy consumption, and determine cost-effective measures that can be implemented by the customer. These measures will decrease the site's energy consumption and provide a favorable payback to the customer over the years. Incentives may be available from Eversource to help defer the cost of implementation.

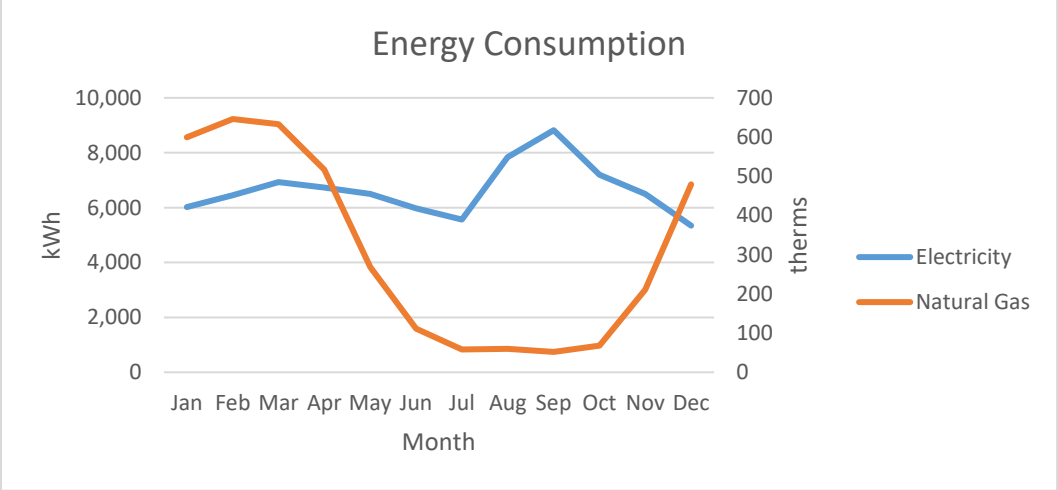
Council on Aging

Existing Conditions

The Town of Rochester Council on Aging is located at 67 Dexter Lane in Rochester, MA. It is a 5,200 square foot facility, constructed in 2001, comprised of office space, a large cafeteria, kitchen, and a small gym. The facility uses electricity and natural gas. The building is heated and cooled by six (6) gas-fired high efficiency condensing furnaces. The furnaces are controlled by six (6) programmable thermostats. Domestic hot water is heated by a standalone standard efficiency gas-fired water heater. The kitchen is operational daily from 6:30 am to 12:00 pm and from 1:00 pm to 6:00 pm to cook breakfast, lunch, and dinner for approximately 50 people. There is a kitchen hood (6' by 3') that is switched on at the beginning of the day and then switched off at the end of the day.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for both the electricity and natural gas usage were collected from Eversource utility bills.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	26,544	0	$4,512.48	$ 29,827.00	$ 6,636.00	5.1
2	Condensing Water Heater	0	43	$ 436.62	$ 20,768.00	$ -	47.6
3	Kitchen Hood Controls	1,316	37	$ 597.42	$ 19,564.40	$ -	32.7
4	Air Sealing	115	22	$ 245.79	$ 28,279.88	$ -	115.1
5	Pre-Rinse Spray Valve	0	11	$ 115.14	$ 110.00	$ 50.00	0.5
	Totals	**27,975**	**114**	**$5,907.45**	**$ 98,549.28**	**$ 6,686.00**	**15.6**

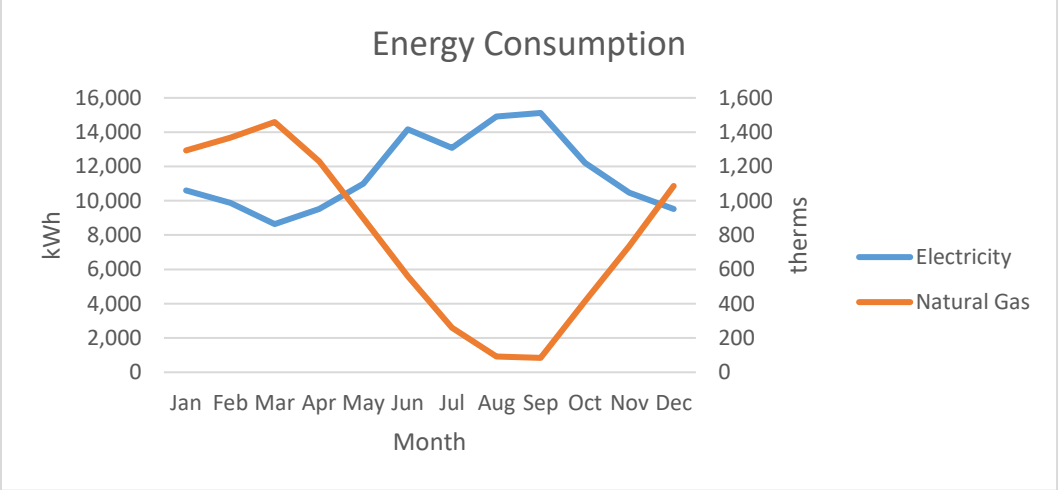
Police Station

Existing Conditions

The Town of Rochester Police Station is located at 29 Dexter Lane in Rochester, MA. It is a 7,316 square foot facility comprised of office space, holding cells, a garage, and a small gym that was constructed in 2001. The facility uses electricity and natural gas. The building is heated by two (2) gas-fired standard efficiency hydronic boilers. The boilers feed a main air handler that then feeds variable air volume boxes in each zone as well as hydronic baseboard. The building is cooled via chilled water coils integrated into their air handlers fed by a small chiller. The zone temperatures are controlled by a central energy management system. Domestic hot water is heated by a standalone standard efficiency gas-fired water heater.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for both the electricity and natural gas usage were collected from Eversource utility bills.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	38,559	0	$6,555.03	$ 30,177.00	$ 9,639.75	3.1
2	Condensing Boiler	0	103	$1,038.28	$ 42,126.00	$ 8,000.00	32.9
3	Pipe Insulation	0	11	$ 106.05	$ 453.12	$ 210.00	2.3
	Totals	**38,559**	**113**	**$7,699.36**	**$ 72,756.12**	**$ 17,849.75**	**7.1**

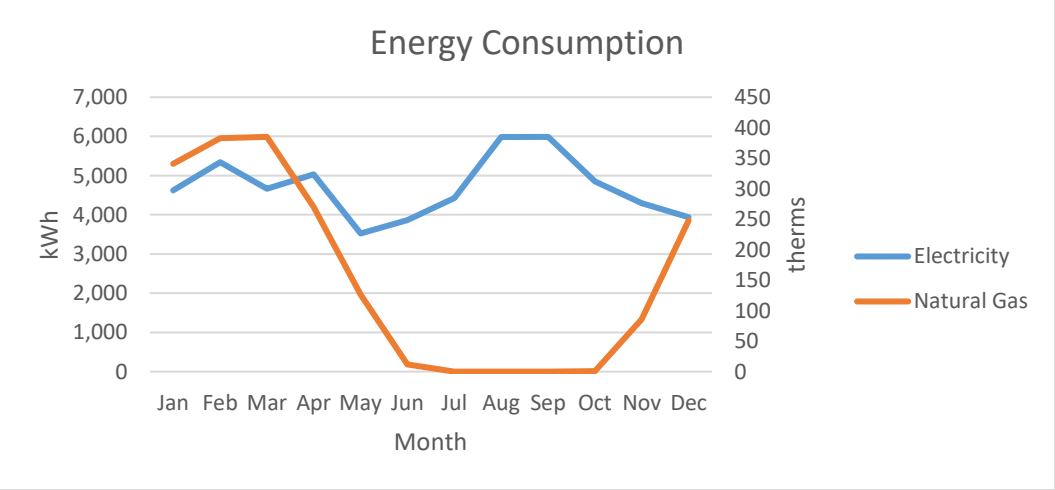
Town Hall

Existing Conditions

The Town of Rochester Town Hall is located at 1 Constitution Way in Rochester, MA. It is a 4,446 square foot facility comprised of office space that was constructed in 1925. The facility uses electricity and natural gas. The building is heated and cooled by three (3) high efficiency gas-fired furnaces. The furnaces are controlled by three (3) programmable thermostats. Domestic hot water is heated by a small standalone electric storage type water heater. The town installed three (3) electric car charging ports in the town hall parking lot. The town owns two (2) electric cars that remain parked and plugged into two (2) charging ports. The third charging port is open to the public and is free to use.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for both the electricity and natural gas usage were collected from Eversource utility bills.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	11,807	0	$2,007.19	$ 19,931.00	$ 2,951.75	8.5
2	Envelope Insulation	0	13	$ 130.29	$ 11,418.86	$ -	87.6
3	Air Sealing	555	45	$ 550.87	$ 8,235.22	$ 1,042.75	13.1
	Totals	**12,362**	**58**	**$2,688.35**	**$ 39,585.08**	**$ 3,994.50**	**13.2**

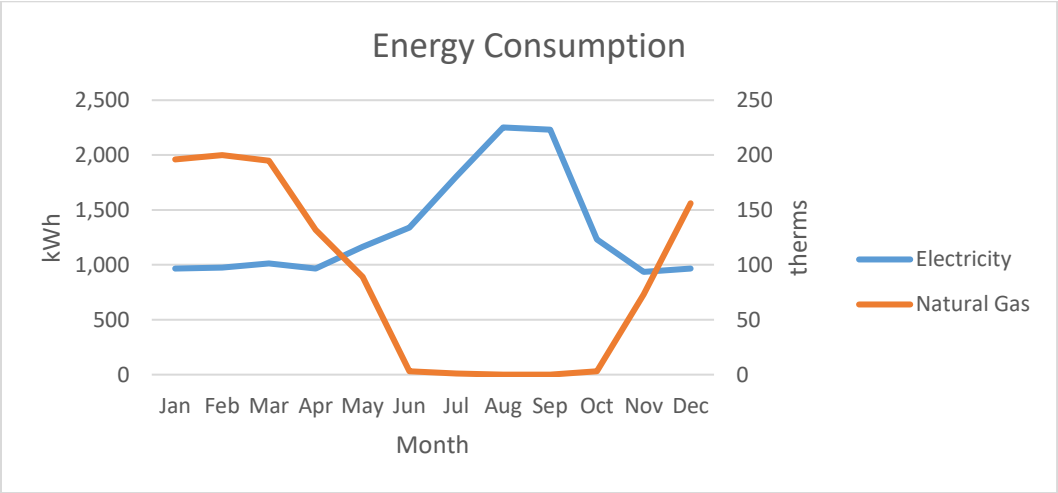
Town Hall Annex

Existing Conditions

The Town of Rochester Town Hall Annex is located at 37 Marion Road in Rochester, MA. It is a 3,040 square foot facility split between office space and the Rochester Woman's Club that was constructed in 1925. The town hall annex portion of the building accounts for about 2,280 square feet. The facility uses electricity and natural gas. The building is heated and cooled by two (2) gas-fired furnaces, with one serving each of the office space and Woman's Club. The furnaces are controlled by two (2) programmable thermostats. Domestic hot water is heated by a small standalone electric storage type water heater in each portion of the building.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for both the electricity and natural gas usage were collected from Eversource utility bills.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	8,902	0	$1,513.34	$ 13,966.00	$ 2,225.50	7.8
2	Condensing Furnace	168	7	$ 96.23	$ 19,316.60	$ 600.00	194.5
	Totals	**9,070**	**7**	**$1,609.57**	**$ 33,282.60**	**$ 2,825.50**	**18.9**

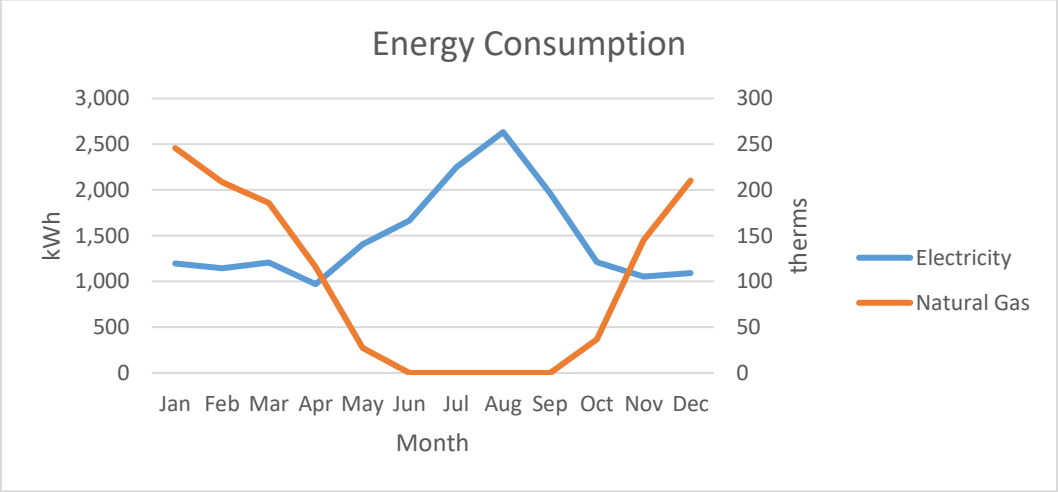
Public Library

Existing Conditions

The Town of Rochester Public Library is located at 17 Constitution Way in Rochester, MA. It is a 2,408 square foot facility that was constructed in 1968. The facility uses electricity, natural gas, and oil. The building is heated and cooled by two (2) standard efficiency furnaces. One (1) of the furnaces is gas-fired and services the entry area. The other furnace is oil-fired and services the rest of the building. There is already natural gas piping installed up to the oil-fired furnace in the basement. The furnaces are controlled by two (2) programmable thermostats. Domestic hot water is heated by a small standalone electric storage type water heater.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for both the electricity and natural gas usage were collected from Eversource utility bills. The facilities oil usage was not available at the time of the audit. An energy model of the facility was constructed to estimate the heating load on the entire facility, which is depicted as "Natural Gas" in the graph below.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	10,673	0	$1,814.41	$ 14,659.00	$ 2,668.25	6.6
2	Envelope Insulation	0	32	$ 318.15	$ 12,779.40	$ -	40.2
3	Condensing Furnace	336	13	$ 192.46	$ 28,674.00	$ 1,200.00	142.8
4	Duct Insulation	0	13	$ 131.30	$ 7,087.08	$ -	54.0
5	Air Sealing	57	11	$ 118.77	$ 14,768.88	$ -	124.3
	Totals	**11,066**	**69**	**$2,575.09**	**$ 77,968.36**	**$ 3,868.25**	**28.8**

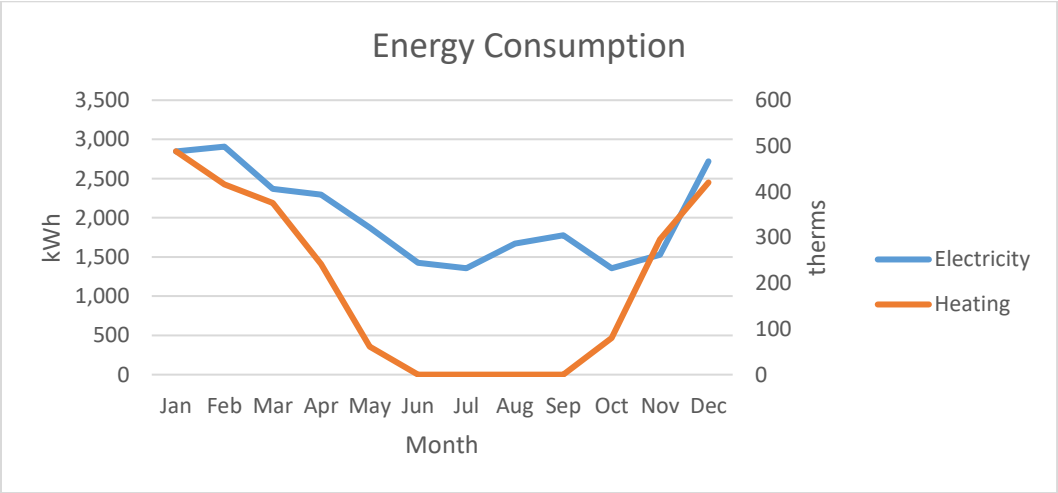
Fire Station #1

Existing Conditions

The Town of Rochester Fire Station #1 is located at 59 Hartley Road in Rochester, MA. It is a 4,936 square foot facility that was constructed in 1940. The facility uses electricity and oil. The building is heated with one (1) oil-fired standard efficiency hydronic boiler. The boiler is controlled by a programmable thermostat. The facility has a multi split with three (3) heads and a minisplit that provide cooling and supplemental heating. Domestic hot water is heated with a standalone electric storage type water heater.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for the electricity usage was collected from Eversource utility bills. The facilities oil consumption was not available at the time of the audit. An energy model of the facility was constructed to estimate the heating load of the building, which is depicted as "Heating" in the graph below.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	5,937	0	$1,009.29	$ 9,387.00	$ 1,484.25	7.8
2	Envelope Insulation	0	21	$ 213.11	$ 4,257.44	$ 422.00	18.0
3	Air Sealing	0	30	$ 299.97	$ 11,230.06	$ 594.00	35.5
4	Pipe Insulation	0	60	$ 606.00	$ 4,956.00	$ 1,200.00	6.2
	Totals	**5,937**	**111**	**$2,128.37**	**$ 29,830.50**	**$ 3,700.25**	**12.3**

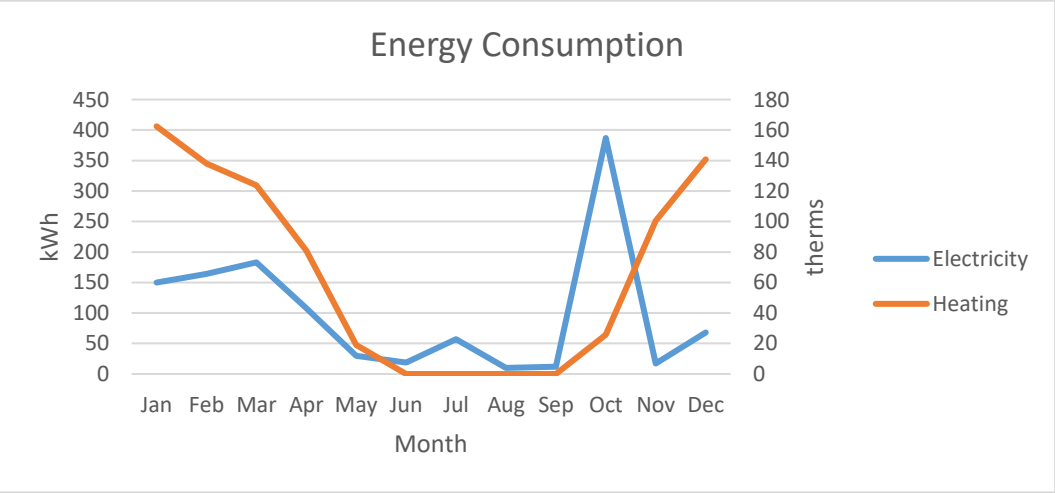
Fire Station #2

Existing Conditions

The Town of Rochester Fire Station #2 is located at 0 Neck Road in Rochester, MA. It is an 800 square foot garage that was constructed in 1997. The building is used as a garage to store a firetruck year round. The facility uses electricity and oil. The building is heated and cooled with one (1) standard efficiency oil fired furnace. The boiler is controlled by a non-programmable thermostat.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for the electricity usage was collected from Eversource utility bills. The facilities oil consumption was not available at the time of the audit. An energy model of the facility was constructed to estimate the heating load of the building, which is depicted as "Heating" in the graph below.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	579	0	$ 98.43	$ 1,243.00	$ 144.75	11.2
2	Envelope Insulation	0	5	$ 54.54	$ 860.22	$ 108.00	13.8
3	Air Sealing	0	7	$ 70.70	$ 1,854.96	$ 140.00	24.3
	Totals	**579**	**12**	**$ 223.67**	**$ 3,958.18**	**$ 392.75**	**15.9**

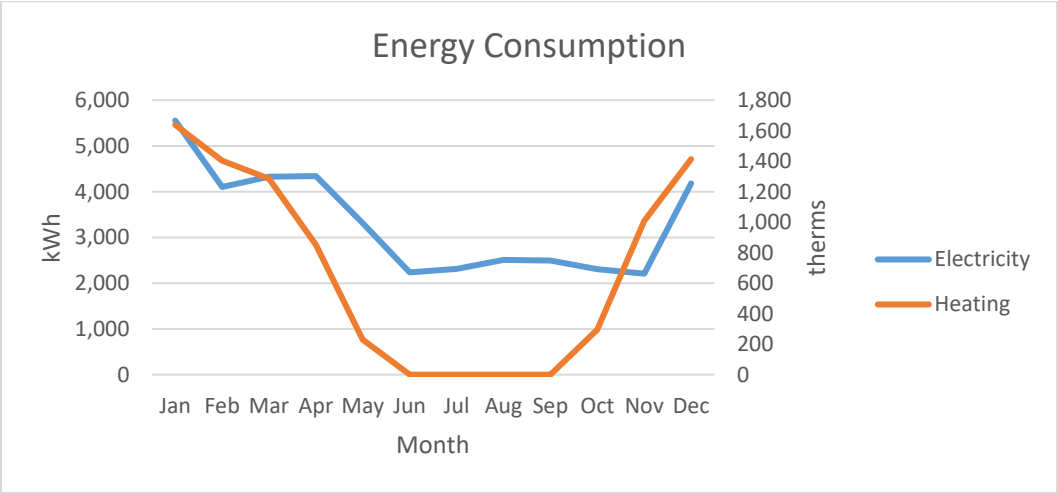
Highway Barn / Fire Station 3

Existing Conditions

The Town of Rochester Highway Barn and Fire Station #3 are located at 200 Ryder Road in Rochester, MA. It is a 14,000 square foot facility that was constructed in 2001. The facility uses electricity, propane, and reclaimed oil. The large garage is primarily heated with an oil-fired furnace but has supplemental propane fired unit heaters. The office space is heated and cooled with a high efficiency propane-fired furnace. Domestic hot water is heated with a standalone electric storage type water heater.

Energy Usage

The graph below depicts the energy consumption of the facility. The data points for the electricity usage was collected from Eversource utility bills. The facilities oil consumption was not available at the time of the audit. An energy model of the facility was constructed to estimate the heating load of the building, which is depicted as "Heating" in the graph below.



Proposed Energy Conservation Measures

		Estimated Savings		Total Savings	Estimated Cost	Estimated Incentive	Simple Payback
ECM	Measure Description	kWh	MMBtu	$	$	$	yrs.
1	LED Lighting Upgrade	18,957	0	$3,222.69	$ 33,704.00	$ 4,739.25	9.0
2	Air Sealing	0	14	$ 136.35	$ 15,505.20	$ -	113.7
	Totals	**18,957**	**14**	**$3,359.04**	**$ 49,209.20**	**$ 4,739.25**	**13.2**

Next Steps

To pursue the recommendations outlined in this report, the customer should reach out to RISE Engineering. RISE Engineering will be able to provide comprehensive proposals for the measures outlined in this report. Once specific proposals are selected, the Town of Rochester can apply to Eversource for financial incentives to help defray the cost of implementation.

If you have any questions with the material presented in this report please contact Frank Davey at FDavey@RISEengineering.com.

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RISE ENGINEERING™

EVERSOURCE

Division of Thielsch Engineering, Inc
1341 Elmwood Avenue
Cranston, Rhode Island 02910

Rochester Dexter Lane Ball Field-LED Lighting Upgrades

Financial Summary

Total Project Cost	**$**	**1,915**
Estimated Electric Incentive	**$**	**(209)**
Customer Net Cost	**$**	**1,706**
Estimated Energy Cost Savings Annually	**$**	**236**
Estimated Maintenance Savings	**$**	**86**
Return on Investment (ROI)		**19%**
Simple Payback in Years		**5.3**

Energy Savings

kW Reduction	kWh Reduction
0.62	836

Pollution Savings

CO2 Reduction (lbs)	NOx Reduction (lbs)	SO2 Reduction (lbs)
1,059	0.9	3.3

Prepared: 5/20/2019

RISE ENGINEERING

Rochester Dexter Lane Ball Field-LED Lighting Upgrades
55 Dexter Lane
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	kW Saved	kWh Saved
1	DEXTER LANE BALL FIELD	1	MAINTENANCE BUILDING	B1	1X4 2L4 T8 32W/NP WRAP	4	1344	60	0.24	323	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 4000K/BYPASS BALLAST	4	1344	48	0.19	258	0.05	65
2	DEXTER LANE BALL FIELD	1	RESTROOMS (2)	A1	1X8 4L4 T8 32W/NP WRAP	2	1344	112	0.22	301	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 4000K/BYPASS BALLAST	2	1344	24	0.05	65	0.18	237
3	DEXTER LANE BALL FIELD	EXT	EXTERIOR FLOODS	FL1	200W QUARTZ FLOOD JB MNT WHT	2	1344	200	0.40	538	NEW RAB 18W FLOOD KNUCKLE MNT BZ	2	1344	18	0.04	48	0.36	489
4	DEXTER LANE BALL FIELD	EXT	EXTERIOR WALLPACKS	WP1	1L42W CFL SMALL WALLPACK WHT	1	1344	48	0.05	65	NEW RAB BRISK 14W LED SMALL WALLPACK BZ PC	1	1344	14	0.01	19	0.03	46
TOTALS						**9**			**0.91**	**1,226**		**9**			**0.29**	**390**	**0.62**	**836**

Prepared: 5/21/2019

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EVERSOURCE

Division of Thielsch Engineering, Inc
1341 Elmwood Avenue
Cranston, Rhode Island 02910

Rochester Gifford Park-LED Lighting Upgrades

Financial Summary

Total Project Cost	**$**	**3,037**
Estimated Electric Incentive	**$**	**(257)**
Customer Net Cost	**$**	**2,780**
Estimated Energy Cost Savings Annually	**$**	**290**
Estimated Maintenance Savings	**$**	**171**
Return on Investment (ROI)		**17%**
Simple Payback in Years		**6.0**

Energy Savings

kW Reduction	kWh Reduction
0.76	1,027

Pollution Savings

CO2 Reduction (lbs)	NOx Reduction (lbs)	SO2 Reduction (lbs)
1,301	1.1	4.1

Prepared: 5/20/2019

RISE ENGINEERING

Rochester Gifford Park-LED Lighting Upgrades
13-43 Mary's Pond Rd
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	kW Saved	kWh Saved
1	GIFFORD PARK	1	CONCESSIONS ENTRANCE	B1	1X4 2L4 T8 32W/NP WRAP	1	1344	60	0.06	81	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 4000K/BYPASS BALLAST	1	1344	24	0.02	32	0.04	48
2	GIFFORD PARK	1	RESTROOM	B1	1X4 2L4 T8 32W/NP WRAP	1	1344	60	0.06	81	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 4000K/BYPASS BALLAST	1	1344	24	0.02	32	0.04	48
3	GIFFORD PARK	1	CONCESSIONS	C1	2X4 4L4' T8 32W/NP RECESSED PRISMATIC	6	1344	112	0.67	903	NEW ELITE 2X4 30W LED RECESSED FLAT PANEL 35K	6	1344	30	0.18	242	0.49	661
4	GIFFORD PARK	EXT	CONCESSIONS EXTERIOR CANOPY	RC1	32W CFL RECESSED CAN 6"	4	1344	34	0.14	183	NEW GC 21CDLA6 14W LED CAN/ RE-USE GASKET	4	1344	14	0.06	75	0.08	108
5	GIFFORD PARK	EXT	EXTERIOR PAVILION	RC1	32W CFL RECESSED CAN 6"	6	1344	34	0.20	274	NEW GC 21CDLA6 14W LED CAN/ RE-USE GASKET	6	1344	14	0.08	113	0.12	161
TOTALS						**18**			**1.13**	**1,521**		**18**			**0.37**	**495**	**0.76**	**1,027**

Prepared: 5/21/2019

Efficiency Energized.

RISE ENGINEERING™

EVERSOURCE

Division of Thielsch Engineering, Inc
1341 Elmwood Avenue
Cranston, Rhode Island 02910

Rochester Memorial School-1st Floor

Financial Summary

Total Project Cost	**$**	**94,080**
Estimated Electric Incentive	**$**	**(24,819)**
Customer Net Cost	**$**	**69,260**
Estimated Energy Cost Savings Annually	**$**	**19,915**
Estimated Maintenance Savings	**$**	**7,866**
Return on Investment (ROI)		**40%**
Simple Payback in Years		**2.5**

Energy Savings

kW Reduction	kWh Reduction
47.96	99,278

Pollution Savings

CO2 Reduction (lbs)	NOx Reduction (lbs)	SO2 Reduction (lbs)
125,785	106.5	393.6

Prepared: 8/14/2019

RISE ENGINEERING

Rochester Memorial School-1st Floor
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-1st Floor

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
27	ROCHESTER MEMORIAL SCHOOL	1	STAIRS	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	4836	37	0.04	179	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	4836	20	0.02	97					0.02	82
28	ROCHESTER MEMORIAL SCHOOL	1	CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	20	4836	37	0.74	3,579	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	20	4836	20	0.40	1934					0.34	1,644
29	ROCHESTER MEMORIAL SCHOOL	1	CORRIDOR	RC1	1L 32W CFL RECESSED CAN 6 1/2""	8	3432	34	0.27	934	NEW ELITE 21W LED 6" REC CAN KIT 35K	8	3432	21	0.17	577					0.10	357
30	ROCHESTER MEMORIAL SCHOOL	1	CORRIDOR	CP1	2X2 4L2' T8 17W/NP RECESSED CANOPY	2	3432	62	0.12	426	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	3432	20	0.04	137					0.08	288
31	ROCHESTER MEMORIAL SCHOOL	1	HALL TO LOBBY	RC1	1L 32W CFL RECESSED CAN 6 1/2""	2	3432	34	0.07	233	NEW ELITE 21W LED 6" REC CAN KIT 35K	2	3432	21	0.04	144					0.03	89
32	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C111	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
33	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C109	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
34	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C112	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
35	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C110	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
36	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C108	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
37	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C107	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
38	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C105	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
39	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C106	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
40	ROCHESTER MEMORIAL SCHOOL	1	SAFE ROOM C106A	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
41	ROCHESTER MEMORIAL SCHOOL	1	TEACHER WORK ROOM C104	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	10	2160	112	1.12	2,419	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	10	2160	48	0.48	1037					0.64	1,382
42	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM C103	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
43	ROCHESTER MEMORIAL SCHOOL	1	TOILET	RC1	1L 32W CFL RECESSED CAN 6 1/2""	2	2160	34	0.07	147	NEW ELITE 21W LED 6" REC CAN KIT 35K	2	1512	21	0.04	64	MS-OPS6M2-DV-WH	1			0.03	83
44	ROCHESTER MEMORIAL SCHOOL	1	ELEVATOR MACHINE ROOM	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
45	ROCHESTER MEMORIAL SCHOOL	1	ELECTRICAL C101A	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
46	ROCHESTER MEMORIAL SCHOOL	1	ART ROOM C101	A2	1X8 6L4' T8 32W/NP DIRECT/INDIRECT PENDANT	12	2160	174	2.09	4,510	RELAMP RPT 6L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	12	2160	72	0.86	1866					1.22	2,644
47	ROCHESTER MEMORIAL SCHOOL	1	ART ROOM C101	BL1	6L4' F40 BIAX 22" PENDANT BOWL-UP	2	2160	282	0.56	1,218	RELAMP RPT 6L22" BIAX 20W LED 3000K/BYPASS BALLAST	2	2160	120	0.24	518					0.32	700
48	ROCHESTER MEMORIAL SCHOOL	1	ART ROOM C101	BL2	1L38W GR10 SQUARE CFL PENDANT BOWL-DOWN	2	2160	36	0.07	156	RETROFIT RPT 12W LEDSR 4 INCH KIT 3000K/BYPASS BALLAST	2	2160	12	0.02	52					0.05	104
49	ROCHESTER MEMORIAL SCHOOL	1	KILN C101C	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	2	2160	37	0.07	160	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	20	0.04	86					0.03	73
50	ROCHESTER MEMORIAL SCHOOL	1	STORAGE ROOM C101B	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	2	1000	37	0.07	74	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	1000	20	0.04	40					0.03	34
51	ROCHESTER MEMORIAL SCHOOL	1	BOYS ROOM	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	4	2160	37	0.15	320	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	20	0.08	173					0.07	147
52	ROCHESTER MEMORIAL SCHOOL	1	GIRLS ROOM	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	4	2160	37	0.15	320	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	20	0.08	173					0.07	147
53	ROCHESTER MEMORIAL SCHOOL	1	CUSTODIAN C102B	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	25	0.03	18	MS-OPS6M2-DV-WH	1			0.04	43
54	ROCHESTER MEMORIAL SCHOOL	1	GYM LOBBY	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	6	4836	37	0.22	1,074	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	4836	20	0.12	580					0.10	493
55	ROCHESTER MEMORIAL SCHOOL	1	D WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	13	4836	37	0.48	2,326	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	13	4836	20	0.26	1257					0.22	1,069
56	ROCHESTER MEMORIAL SCHOOL	1	GIRLS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	4	2160	60	0.24	518	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	24	0.10	207					0.14	311
57	ROCHESTER MEMORIAL SCHOOL	1	BOYS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	4	2160	60	0.24	518	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	24	0.10	207					0.14	311
58	ROCHESTER MEMORIAL SCHOOL	1	TOILETS (2)	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
60	ROCHESTER MEMORIAL SCHOOL	1	D WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	11	4836	37	0.41	1,968	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	11	4836	20	0.22	1064					0.19	904
61	ROCHESTER MEMORIAL SCHOOL	1	D WING CORRIDOR	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	3432	60	0.12	412	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	3432	24	0.05	165					0.07	247
62	ROCHESTER MEMORIAL SCHOOL	1	D WING CORRIDOR	A3	1X8 4L4' T8 32W/NP STRIP	2	3432	112	0.22	769	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	3432	50	0.10	343					0.12	426
63	ROCHESTER MEMORIAL SCHOOL	1	DRAMA STORAGE D120	A3	1X8 4L4' T8 32W/NP STRIP	3	2160	112	0.34	726	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	2160	50	0.15	324					0.19	402
64	ROCHESTER MEMORIAL SCHOOL	1	GYM OFFICE	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	3432	60	0.06	206	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	3432	24	0.02	82					0.04	124
65	ROCHESTER MEMORIAL SCHOOL	1	MUSIC CORRIDOR	BL1	6L4' F40 BIAX 22" PENDANT BOWL-UP	8	4836	282	2.26	10,910	RELAMP RPT 6L22" BIAX 20W LED 3000K/BYPASS BALLAST	8	4836	120	0.96	4643					1.30	6,267
66	ROCHESTER MEMORIAL SCHOOL	1	MUSIC CORRIDOR	BL2	1L38W GR10 SQUARE CFL PENDANT BOWL-DOWN	8	3432	36	0.29	988	RETROFIT RPT 12W LEDSR 4 INCH KIT 3000K/BYPASS BALLAST	8	3432	12	0.10	329					0.19	659
67	ROCHESTER MEMORIAL SCHOOL	1	MUSIC CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	3432	37	0.04	127	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	3432	20	0.02	69					0.02	58
68	ROCHESTER MEMORIAL SCHOOL	1	MUSIC D143	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	9	2160	112	1.01	2,177	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	9	2160	48	0.43	933					0.58	1,244
69	ROCHESTER MEMORIAL SCHOOL	1	MUSIC STORAGE D142	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156

RISE ENGINEERING

Rochester Memorial School-1st Floor
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-1st Floor

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
70	ROCHESTER MEMORIAL SCHOOL	1	MUSIC STORAGE D141	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
71	ROCHESTER MEMORIAL SCHOOL	1	BAND D140	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	9	2160	112	1.01	2,177	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	9	2160	48	0.43	933					0.58	1,244
72	ROCHESTER MEMORIAL SCHOOL	1	JANITOR CLOSET	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
73	ROCHESTER MEMORIAL SCHOOL	1	TELE/COM DATA D120A	A3	1X8 4L4' T8 32W/NP STRIP	2	1000	112	0.22	224	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	50	0.10	100					0.12	124
74	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
75	ROCHESTER MEMORIAL SCHOOL	1	STORAGE ROOM	A3	1X8 4L4' T8 32W/NP STRIP	3	1000	112	0.34	336	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1000	50	0.15	150					0.19	186
76	ROCHESTER MEMORIAL SCHOOL	1	STORAGE ROOM	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
77	ROCHESTER MEMORIAL SCHOOL	1	OFFICE	A3	1X8 4L4' T8 32W/NP STRIP	1	2160	112	0.11	242	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1512	50	0.05	76	MS-OPS6M2-DV-WH	1			0.06	166
78	ROCHESTER MEMORIAL SCHOOL	1	TRASH/RECYCLE D144	A3	1X8 4L4' T8 32W/NP STRIP	2	3432	112	0.22	769	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	3432	50	0.10	343					0.12	426
79	ROCHESTER MEMORIAL SCHOOL	1	MAIN ELECTRIC	A3	1X8 4L4' T8 32W/NP STRIP	2	1000	112	0.22	224	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	50	0.10	100					0.12	124
80	ROCHESTER MEMORIAL SCHOOL	1	BOILER ROOM	A3	1X8 4L4' T8 32W/NP STRIP	8	2160	112	0.90	1,935	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	8	2160	50	0.40	864					0.50	1,071
81	ROCHESTER MEMORIAL SCHOOL	1	FUEL STORAGE	JJ1	1L 26W CFL JELLY JAR	5	4380	28	0.14	613	NEW RAB BRISK 14W LED SMALL WALLPACK BZ PC	5	4380	14	0.07	307					0.07	307
82	ROCHESTER MEMORIAL SCHOOL	1	GARAGE - TRACTOR	A3	1X8 4L4' T8 32W/NP STRIP	3	1000	112	0.34	336	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1000	50	0.15	150					0.19	186
83	ROCHESTER MEMORIAL SCHOOL	1	EXT. STORAGE D149	A3	1X8 4L4' T8 32W/NP STRIP	3	1000	112	0.34	336	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1000	50	0.15	150					0.19	186
84	ROCHESTER MEMORIAL SCHOOL	1	EMERGENCY GENERATOR D148A	A3	1X8 4L4' T8 32W/NP STRIP	3	1000	112	0.34	336	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1000	50	0.15	150					0.19	186
85	ROCHESTER MEMORIAL SCHOOL	1	KITCHEN D124	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	10	2340	60	0.60	1,404	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	10	2340	24	0.24	562					0.36	842
86	ROCHESTER MEMORIAL SCHOOL	1	DISHWASH D125	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2340	60	0.12	281	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	24	0.05	112					0.07	168
87	ROCHESTER MEMORIAL SCHOOL	1	STORAGE D126	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
88	ROCHESTER MEMORIAL SCHOOL	1	FOOD STORAGE	A3	1X8 4L4' T8 32W/NP STRIP	3	2340	112	0.34	786	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1638	50	0.15	246	LRF2-OWLB-P-WH	2	MRF2-8S-DV-WH	2	0.19	541
89	ROCHESTER MEMORIAL SCHOOL	1	TEL/COM D128A	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	25	0.03	18	MS-OPS6M2-DV-WH	1			0.04	43
90	ROCHESTER MEMORIAL SCHOOL	1	KITCHEN HALL	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	2	4836	37	0.07	358	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	4836	20	0.04	193					0.03	164
91	ROCHESTER MEMORIAL SCHOOL	1	KITCHEN HALL	A3	1X8 4L4' T8 32W/NP STRIP	3	3432	112	0.34	1,153	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	3432	50	0.15	515					0.19	638
92	ROCHESTER MEMORIAL SCHOOL	1	KITCHEN OFFICE	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2340	60	0.06	140	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	1638	24	0.02	39	MS-OPS6M2-DV-WH	1			0.04	101
93	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	1512	24	0.02	36	MS-OPS6M2-DV-WH	1			0.04	93
94	ROCHESTER MEMORIAL SCHOOL	1	STORAGE D121	A3	1X8 4L4' T8 32W/NP STRIP	3	1000	112	0.34	336	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	700	50	0.15	105	LRF2-OWLB-P-WH	1	MRF2-8S-DV-WH	1	0.19	231
95	ROCHESTER MEMORIAL SCHOOL	1	CAFETERIA	G2	1X4 3L4' T5HO 54W/PS HIF HIGHBAY	20	2340	177	3.54	8,284	NEW 1X4 FLEX ES40V 105W LED HIGHBAY	20	2340	106	2.12	4961					1.42	3,323
96	ROCHESTER MEMORIAL SCHOOL	1	CAFETERIA	RC3	1L 18W CFL RECESSED CAN 6 1/2""	9	2340	20	0.18	421	NEW ELITE 10W LED 4" REC CAN KIT 35K	9	2340	10	0.09	211					0.09	211
97	ROCHESTER MEMORIAL SCHOOL	1	CAFETERIA	CYL1	1L 300W PAR38 HALOGEN PENDANT CYLINDER-DIM	24	1000	300	7.20	7,200	RELAMP GC 17W LED FLOOD PAR38 2700K	24	1000	17	0.41	408					6.79	6,792
98	ROCHESTER MEMORIAL SCHOOL	1	STAGE	A3	1X8 4L4' T8 32W/NP STRIP	4	1000	112	0.45	448	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	4	1000	50	0.20	200					0.25	248
99	ROCHESTER MEMORIAL SCHOOL	1	STAGE	TR1	1L 250W PAR38 HALOGEN TRACK HEAD-DIM	12	500	250	3.00	1,500	RELAMP GC 17W LED FLOOD PAR38 2700K	12	500	17	0.20	102					2.80	1,398
100	ROCHESTER MEMORIAL SCHOOL	1	STAGE	CYL1	1L 300W PAR38 HALOGEN PENDANT CYLINDER-DIM	8	500	300	2.40	1,200	RELAMP GC 17W LED FLOOD PAR38 2700K	8	500	17	0.14	68					2.26	1,132
101	ROCHESTER MEMORIAL SCHOOL	1	DRY STORAGE D127	A3	1X8 4L4' T8 32W/NP STRIP	1	1000	112	0.11	112	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	50	0.05	35	MS-OPS6M2-DV-WH	1			0.06	77
102	ROCHESTER MEMORIAL SCHOOL	1	FRONT LOBBY	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	13	4836	37	0.48	2,326	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	13	4836	20	0.26	1257					0.22	1,069
103	ROCHESTER MEMORIAL SCHOOL	1	FRONT LOBBY DISPLAY	RC1	1L 32W CFL RECESSED CAN 6 1/2""	4	4836	34	0.14	658	NEW ELITE 21W LED 6" REC CAN KIT 35K	4	4836	21	0.08	406					0.05	251
104	ROCHESTER MEMORIAL SCHOOL	1	A WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	27	4836	37	1.00	4,831	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	27	4836	20	0.54	2611					0.46	2,220
105	ROCHESTER MEMORIAL SCHOOL	1	A WING CORRIDOR	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	3432	60	0.06	206	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	3432	24	0.02	82					0.04	124
106	ROCHESTER MEMORIAL SCHOOL	1	RECEPTION A101	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	6	3432	37	0.22	762	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	3432	20	0.12	412					0.10	350
107	ROCHESTER MEMORIAL SCHOOL	1	OPEN HALL AREA	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	14	3432	37	0.52	1,778	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	14	3432	20	0.28	961					0.24	817
108	ROCHESTER MEMORIAL SCHOOL	1	CLOSET A101C	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
109	ROCHESTER MEMORIAL SCHOOL	1	TOILET	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	2160	37	0.04	80	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	20	0.02	43					0.02	37
110	ROCHESTER MEMORIAL SCHOOL	1	STORAGE A101E				1000					0	1000									0
111	ROCHESTER MEMORIAL SCHOOL	1	CONFERENCE ROOM A101B	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	3	2340	60	0.18	421	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1638	20	0.05	79	LRF2-OCR2B-P-WH	1	FCJS-010	3	0.13	343

Prepared: 8/14/2019

RISE ENGINEERING

Rochester Memorial School-1st Floor
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-1st Floor

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
112	ROCHESTER MEMORIAL SCHOOL	1	PRINCIPALS OFFICE A103A	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	3	2340	60	0.18	421	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	1638	20	0.05	79	LRF2-OCR2B-P-WH	1	FCJS-010	3	0.13	343
113	ROCHESTER MEMORIAL SCHOOL	1	MRS. AMATO OFFICE A101A	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	2	2340	60	0.12	281	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1638	20	0.03	52	LRF2-OCR2B-P-WH	1	FCJS-010	2	0.09	228
114	ROCHESTER MEMORIAL SCHOOL	1	NURSE A102F	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2340	60	0.12	281	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	24	0.05	112					0.07	168
115	ROCHESTER MEMORIAL SCHOOL	1	NURSE A102A	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	3	2340	60	0.18	421	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	1638	24	0.06	94	LRF2-OCR2B-P-WH	1	FCJS-010	3	0.12	327
116	ROCHESTER MEMORIAL SCHOOL	1	NURSE TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2340	60	0.06	140	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2340	24	0.02	56					0.04	84
117	ROCHESTER MEMORIAL SCHOOL	1	NURSE EXAM A102C	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2340	60	0.06	140	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2340	24	0.02	56					0.04	84
118	ROCHESTER MEMORIAL SCHOOL	1	NURSE COT ROOM A102D	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2340	60	0.06	140	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2340	24	0.02	56					0.04	84
119	ROCHESTER MEMORIAL SCHOOL	1	NURSE COT ROOM A102D	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	2340	37	0.04	87	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2340	20	0.02	47					0.02	40
120	ROCHESTER MEMORIAL SCHOOL	1	MRS. RYAN OFFICE A102B	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2340	112	0.22	524	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	48	0.10	225					0.13	300
121	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A104	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
122	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A104	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
123	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A105	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
124	ROCHESTER MEMORIAL SCHOOL	1	JANITOR CLOSET A106D	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	1000	60	0.06	60	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	1000	24	0.02	24					0.04	36
125	ROCHESTER MEMORIAL SCHOOL	1	BOYS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
126	ROCHESTER MEMORIAL SCHOOL	1	BOYS ROOM	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	2160	37	0.04	80	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	20	0.02	43					0.02	37
127	ROCHESTER MEMORIAL SCHOOL	1	ELECTRICAL A106B	A3	1X8 4L4' T8 32W/NP STRIP	1	1000	112	0.11	112	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	50	0.05	50					0.06	62
128	ROCHESTER MEMORIAL SCHOOL	1	STAIRS TO BASEMENT	B1	1X4 2L4' T8 32W/NP STRIP	1	3432	60	0.06	206	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	3432	25	0.03	86					0.04	120
129	ROCHESTER MEMORIAL SCHOOL	B	BASEMENT	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
130	ROCHESTER MEMORIAL SCHOOL	B	BASEMENT	A3	1X8 4L4' T8 32W/NP STRIP	2	1000	112	0.22	224	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	50	0.10	100					0.12	124
131	ROCHESTER MEMORIAL SCHOOL	1	CORRIDOR DISPLAYS (2)	B1	1X4 2L4' T8 32W/NP STRIP	2	3432	60	0.12	412	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	3432	25	0.05	172					0.07	240
132	ROCHESTER MEMORIAL SCHOOL	1	EXIT HALL AT DOOR 20	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	2	4836	37	0.07	358	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	4836	20	0.04	193					0.03	164
133	ROCHESTER MEMORIAL SCHOOL	1	AV STORAGE A108B	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	1000	60	0.12	120	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	1000	24	0.05	48					0.07	72
134	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	2	2340	37	0.07	173	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	20	0.04	94					0.03	80
135	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	12	2340	112	1.34	3,145	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	12	2340	48	0.58	1348					0.77	1,797
136	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER	BL1	6L4' F40 BIAX 22" PENDANT BOWL-UP	8	2340	282	2.26	5,279	RELAMP RPT 6L22" BIAX 20W LED 3000K/BYPASS BALLAST	8	2340	120	0.96	2246					1.30	3,033
137	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER	BL2	1L38W GR10 SQUARE CFL PENDANT BOWL-DOWN	8	2340	36	0.29	674	RETROFIT RPT 12W LEDSR 4 INCH KIT 3000K/BYPASS BALLAST	8	2340	12	0.10	225					0.19	449
138	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER OFFICE A108A	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	2	2340	60	0.12	281	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1638	20	0.03	52	LRF2-OCR2B-P-WH	1	FCJS-010	2	0.09	228
139	ROCHESTER MEMORIAL SCHOOL	1	BOOK STORAGE A106C	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	1000	60	0.12	120	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	1000	24	0.05	48					0.07	72
140	ROCHESTER MEMORIAL SCHOOL	1	COPY ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2340	60	0.12	281	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	1638	24	0.05	79	MS-OPS6M2-DV-WH	1			0.07	202
141	ROCHESTER MEMORIAL SCHOOL	1	MEDIA CENTER MEZZ	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2340	112	0.22	524	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	48	0.10	225					0.13	300
142	ROCHESTER MEMORIAL SCHOOL	1	DATA CLOSET	A3	1X8 4L4' T8 32W/NP STRIP	1	1000	112	0.11	112	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	50	0.05	50					0.06	62
143	ROCHESTER MEMORIAL SCHOOL	1	MEZZ STORAGE	A3	1X8 4L4' T8 32W/NP STRIP	1	1000	112	0.11	112	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	50	0.05	35	MS-OPS6M2-DV-WH	1			0.06	77
144	ROCHESTER MEMORIAL SCHOOL	1	COMPUTER LAB B109	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	7	2160	60	0.42	907	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	7	1512	20	0.11	169	LRF2-OCR2B-P-WH	2	FCJS-010	7	0.31	738
145	ROCHESTER MEMORIAL SCHOOL	1	STORAGE B109A	A3	1X8 4L4' T8 32W/NP STRIP	1	1000	112	0.11	112	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	50	0.05	35	MS-OPS6M2-DV-WH	1			0.06	77
146	ROCHESTER MEMORIAL SCHOOL	1	GIRLS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	3	2160	60	0.18	389	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	2160	24	0.07	156					0.11	233
147	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A107	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
148	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A110A	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	4	2160	60	0.24	518	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	4	1512	20	0.06	97	LRF2-OCR2B-P-WH	1	FCJS-010	4	0.18	422
149	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A109	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
150	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A110B	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	4	2160	60	0.24	518	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	4	1512	20	0.06	97	LRF2-OCR2B-P-WH	1	FCJS-010	4	0.18	422
151	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A112A	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	2	2160	60	0.12	259	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1512	20	0.03	48	LRF2-OCR2B-P-WH	1	FCJS-010	2	0.09	211
152	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A112A	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	1	2160	37	0.04	80	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	1512	20	0.02	24			FCJS-010	1	0.02	56
153	ROCHESTER MEMORIAL SCHOOL	1	MENS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78

RISE ENGINEERING

Rochester Memorial School-1st Floor
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-1st Floor

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
154	ROCHESTER MEMORIAL SCHOOL	1	WOMANS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
155	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A112B	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	7	2160	60	0.42	907	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	7	1512	20	0.11	169	LRF2-OCR2B-P-WH	1	FCJS-010	7	0.31	738
156	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A111	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
157	ROCHESTER MEMORIAL SCHOOL	1	A WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	17	4836	37	0.63	3,042	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	17	4836	20	0.34	1644					0.29	1,398
158	ROCHESTER MEMORIAL SCHOOL	1	A WING CORRIDOR	RC1	1L 32W CFL RECESSED CAN 6 1/2""	4	3432	34	0.14	467	NEW ELITE 21W LED 6" REC CAN KIT 35K	4	3432	21	0.08	288					0.05	178
159	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A113	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
160	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A113	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	3	2160	60	0.18	389	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	2160	24	0.07	156					0.11	233
161	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
162	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A115	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
163	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A115	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
164	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
165	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A118	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	11	2160	112	1.23	2,661	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	11	2160	48	0.53	1140					0.70	1,521
166	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A118	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	3	2160	60	0.18	389	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	2160	24	0.07	156					0.11	233
167	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
168	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A 114B	C2	2X4 2L4' T8 32W/NP REC VOLUMETRIC QUICKSTEP DIM	5	2160	60	0.30	648	RETROFIT RPT 2L4' 10W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	5	1512	20	0.08	121	LRF2-OCR2B-P-WH	1	FCJS-010	5	0.22	527
169	ROCHESTER MEMORIAL SCHOOL	1	PLANNING ROOM A114A	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
170	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A116	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
171	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A122	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	11	2160	112	1.23	2,661	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	11	2160	48	0.53	1140					0.70	1,521
172	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM A122	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	3	2160	60	0.18	389	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	2160	24	0.07	156					0.11	233
173	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
174	ROCHESTER MEMORIAL SCHOOL	1	WORK ROOM A120	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
175	ROCHESTER MEMORIAL SCHOOL	1	B WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	21	4836	37	0.78	3,758	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	21	4836	20	0.42	2031					0.36	1,726
176	ROCHESTER MEMORIAL SCHOOL	1	GIRLS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
177	ROCHESTER MEMORIAL SCHOOL	1	CUSTODIAN CLOSET	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
178	ROCHESTER MEMORIAL SCHOOL	1	BOYS ROOM	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	3	2160	60	0.18	389	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	3	2160	24	0.07	156					0.11	233
179	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B115	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	7	2160	112	0.78	1,693	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	7	2160	48	0.34	726					0.45	968
180	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
181	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B116	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	11	2160	112	1.23	2,661	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	11	2160	48	0.53	1140					0.70	1,521
182	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B116	B1	1X4 2L4' T8 32W/NP STRIP	3	2160	60	0.18	389	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	3	2160	25	0.08	162					0.11	227
183	ROCHESTER MEMORIAL SCHOOL	1	TOILET	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
184	ROCHESTER MEMORIAL SCHOOL	1	PLANNING ROOM B114C	C1	2X4 2L4' T8 32W/NP RECESSED VOLUMETRIC	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
185	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B114B	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
186	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B114A	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
187	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B114A	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
188	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B114A	B1	1X4 2L4' T8 32W/NP STRIP	1	2160	60	0.06	130	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	2160	25	0.03	54					0.04	76
189	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B112	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
190	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B112	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
191	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B112	B1	1X4 2L4' T8 32W/NP STRIP	1	2160	60	0.06	130	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	2160	25	0.03	54					0.04	76
192	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B113	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	7	2160	112	0.78	1,693	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	7	2160	48	0.34	726					0.45	968
193	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B113	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
194	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B113	B1	1X4 2L4' T8 32W/NP STRIP	1	2160	60	0.06	130	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	2160	25	0.03	54					0.04	76
195	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B111	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829

RISE ENGINEERING

Rochester Memorial School-1st Floor
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-1st Floor

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
196	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B111	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
197	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B111	B1	1X4 2L4' T8 32W/NP STRIP	2	2160	60	0.12	259	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	2160	25	0.05	108					0.07	151
198	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B110	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	8	2160	112	0.90	1,935	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	2160	48	0.38	829					0.51	1,106
199	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B110	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
200	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B110	B1	1X4 2L4' T8 32W/NP STRIP	2	2160	60	0.12	259	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	2160	25	0.05	108					0.07	151
201	ROCHESTER MEMORIAL SCHOOL	1	B WING HALL	DR1	1L 32W CFL CF32 DT/E 4PIN DRUM	15	4836	34	0.51	2,466	RELAMP LED 10W LED 4PIN OMNI-DIRECTIONAL LAMP/BYPASS BALLAST	15	4836	10	0.15	725					0.36	1,741
202	ROCHESTER MEMORIAL SCHOOL	1	B WING CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	8	3432	37	0.30	1,016	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	8	3432	20	0.16	549					0.14	467
203	ROCHESTER MEMORIAL SCHOOL	1	B WING CORRIDOR	RC1	1L 32W CFL RECESSED CAN 6 1/2""	8	3432	34	0.27	934	NEW ELITE 21W LED 6" REC CAN KIT 35K	8	3432	21	0.17	577					0.10	357
204	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B107	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
205	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B107	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
206	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B108	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
207	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B108	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
208	ROCHESTER MEMORIAL SCHOOL	1	MR. SIMMONDS B105B	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
209	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B106	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
210	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B106	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
211	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B104	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
212	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B104	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
213	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B105A	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
214	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B103	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
215	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B103	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
216	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B102	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
217	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B102	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
218	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B101	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
219	ROCHESTER MEMORIAL SCHOOL	1	CLASSROOM B101	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	60	0.12	259	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	24	0.05	104					0.07	156
TOTALS						**828**			**77.31**	**172,150**		**828**			**29.35**	**72872**		**25**			**47.96**	**99,278**

Prepared: 8/14/2019

Efficiency Energized.

RISE ENGINEERING™

EVERSOURCE

Division of Thielsch Engineering, Inc
1341 Elmwood Avenue
Cranston, Rhode Island 02910

Rochester Memorial School-2nd Floor-Exterior-Gym

Financial Summary

Total Project Cost	**$**	**44,210**
Estimated Electric Incentive	**$**	**(7,235)**
Customer Net Cost	**$**	**36,975**
Estimated Energy Cost Savings Annually	**$**	**5,805**
Estimated Maintenance Savings	**$**	**1,815**
Return on Investment (ROI)		**21%**
Simple Payback in Years		**4.9**

Energy Savings

kW Reduction	kWh Reduction
7.89	28,941

Pollution Savings

CO2 Reduction (lbs)	NOx Reduction (lbs)	SO2 Reduction (lbs)
36,668	31.1	114.7

Prepared: 8/14/2019

RISE ENGINEERING

Rochester Memorial School-2nd Floor-Exterior-Gym
16 Pine Street
Rochester MA 02770
Andrew Daniel

ECM: LED Lighting Upgrades & Controls-2nd Floor-Exterior-Gym

LOCATION					EXISTING CONDITIONS						PROPOSED CONDITIONS						SENSOR DETAIL				ENERGY SAVINGS	
Line Item	Building	Floor	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	Power Pack Model #	Power Pack Qty	kW Saved	kWh Saved
1	ROCHESTER MEMORIAL SCHOOL	2	STAIRS	BL1	6L4' F40 BIAX 22" PENDANT BOWL-UP	3	4836	282	0.85	4,091	RELAMP RPT 6L22" BIAX 20W LED 3000K/BYPASS BALLAST	3	4836	120	0.36	1741					0.49	2,350
2	ROCHESTER MEMORIAL SCHOOL	2	STAIRS	BL2	1L38W GR10 SQUARE CFL PENDANT BOWL-DOWN	3	4836	36	0.11	522	RETROFIT RPT 12W LEDSR 4 INCH KIT 3000K/BYPASS BALLAST	3	4836	12	0.04	174					0.07	348
3	ROCHESTER MEMORIAL SCHOOL	2	STAIRS	RC1	1L 32W CFL RECESSED CAN 6 1/2""	2	4836	34	0.07	329	NEW ELITE 21W LED 6" REC CAN KIT 35K	2	4836	21	0.04	203					0.03	126
4	ROCHESTER MEMORIAL SCHOOL	2	CORRIDOR	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	20	4836	37	0.74	3,579	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	20	4836	20	0.40	1934					0.34	1,644
5	ROCHESTER MEMORIAL SCHOOL	2	CORRIDOR	RC1	1L 32W CFL RECESSED CAN 6 1/2""	8	3432	34	0.27	934	NEW ELITE 21W LED 6" REC CAN KIT 35K	8	3432	21	0.17	577					0.10	357
6	ROCHESTER MEMORIAL SCHOOL	2	STAIRS	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	6	4836	37	0.22	1,074	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	4836	20	0.12	580					0.10	493
7	ROCHESTER MEMORIAL SCHOOL	2	GIRLS ROOM	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	4	2160	37	0.15	320	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	20	0.08	173					0.07	147
8	ROCHESTER MEMORIAL SCHOOL	2	BOYS ROOM	D1	2X2 2L2' T8 17W/NP RECESSED VOLUMETRIC	4	2160	37	0.15	320	RELAMP RPT 2L2' T8 10W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	20	0.08	173					0.07	147
9	ROCHESTER MEMORIAL SCHOOL	2	JANITOR CLOSET	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	700	25	0.03	18	MS-OPS6M2-DV-WH	1			0.04	43
10	ROCHESTER MEMORIAL SCHOOL	2	ELECTRICAL C201	B1	1X4 2L4' T8 32W/NP STRIP	1	1000	60	0.06	60	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	1	1000	25	0.03	25					0.04	35
11	ROCHESTER MEMORIAL SCHOOL	2	DATA CLOSET C202	B1	1X4 2L4' T8 32W/NP STRIP	2	1000	60	0.12	120	RETROFIT RPT 1L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	25	0.05	50					0.07	70
12	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C203	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	4	2160	112	0.45	968	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	4	2160	48	0.19	415					0.26	553
13	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C203	B2	1X4 2L4' T8 32W/NP DIRECT/INDIRECT PENDANT	1	2160	60	0.06	130	RELAMP RPT 2L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	1	2160	24	0.02	52					0.04	78
14	ROCHESTER MEMORIAL SCHOOL	2	ASSISTANT PRINCIPAL C204B	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2340	112	0.22	524	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2340	48	0.10	225					0.13	300
15	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C204A	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
16	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C206B	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
17	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C206B	RC2	1L 32W CFL RECESSED CAN 6 1/2""	4	2160	34	0.14	294	NEW ELITE 15W LED REC CAN 6" RL641-1150L-DIM10-MVOLT-35K-90-W-WH	4	2160	15	0.05	104			FCJS-010	4	0.09	190
18	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C205	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
19	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C205	RC2	1L 32W CFL RECESSED CAN 6 1/2""	3	2160	34	0.10	220	NEW ELITE 15W LED REC CAN 6" RL641-1150L-DIM10-MVOLT-35K-90-W-WH	3	2160	15	0.04	78			FCJS-010	3	0.07	143
20	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C206A	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	2	2160	112	0.22	484	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	2	2160	48	0.10	207					0.13	276
21	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C208	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
22	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C207	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
23	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C209	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
24	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C210	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
25	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C212	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
26	ROCHESTER MEMORIAL SCHOOL	2	CLASSROOM C211	A1	1X8 4L4' T8 32W/NP DIRECT/INDIRECT PENDANT	6	2160	112	0.67	1,452	RELAMP RPT 4L4' T8 12W TOTALTUBE G3 LED 3500K/BYPASS BALLAST	6	2160	48	0.29	622					0.38	829
59	ROCHESTER MEMORIAL SCHOOL	1	GYM D112	G1	1X4 4L4' T5HO 54W/PS HIF HIGHBAY	30	3744	218	6.54	24,486	NEW 1X4 FLEX ES40V 105W LED HIGHBAY	42	2620.8	106	4.45	11668	LRF2-OKLB-P-WH	8	RMJS-16R-DV-B	4	2.09	12,818
220	ROCHESTER MEMORIAL SCHOOL	WELL HOUSE	FIRE SPRINKLER ROOM	A3	1X8 4L4' T8 32W/NP STRIP	2	1000	112	0.22	224	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	50	0.10	100					0.12	124
221	ROCHESTER MEMORIAL SCHOOL	WELL HOUSE	PUMP ROOM	A3	1X8 4L4' T8 32W/NP STRIP	2	1000	112	0.22	224	RETROFIT RPT 2L4' 25W LBI INTERNAL DRIVER 3500K/BYPASS BALLAST	2	1000	50	0.10	100					0.12	124
222	ROCHESTER MEMORIAL SCHOOL	WELL HOUSE	EXTERIOR JELLY JARS	JJ1	1L 26W CFL JELLY JAR	3	4380	28	0.08	368	NEW RAB BRISK 14W LED SMALL WALLPACK BZ PC	3	4380	14	0.04	184					0.04	184
223	ROCHESTER MEMORIAL SCHOOL	EXTERIOR	WALLPACKS DOOR 8-16	WP1	1L 32W CFL WALLPACK BZ	10	4380	34	0.34	1,489	NEW RPT 20W LED SMALL WALLPACK BZ CUTOFF	10	4380	20	0.20	876					0.14	613
224	ROCHESTER MEMORIAL SCHOOL	EXTERIOR	DOOR 7	F1	1L 32W CFL WALL PACK	1	4380	34	0.03	149	NEW LITHONIA 21W LED FLOOD BZ KNUCKLE MNT/ADD 2 JB TO MOUNT	2	4380	21	0.04	184					-0.01	-35
225	ROCHESTER MEMORIAL SCHOOL	EXTERIOR	DOOR 2-7, 19, 20	WP1	1L 32W CFL WALLPACK BZ	9	4380	34	0.31	1,340	NEW RPT 20W LED SMALL WALLPACK BZ CUTOFF	9	4380	20	0.18	788					0.13	552
226	ROCHESTER MEMORIAL SCHOOL	EXTERIOR	DOOR 1	CYL2	1L 90W HALOGEN SURFACE CYLINDER	3	4380	90	0.27	1,183	NEW RPT 30W LOW PROFILE CANOPY	3	4380	30	0.09	394					0.18	788
227	ROCHESTER MEMORIAL SCHOOL	EXTERIOR	SCHOOL SIGN	F2	1L 32W CFL FLOOD JB MOUNT	2	4380	34	0.07	298	NEW LITHONIA 21W LED FLOOD BZ KNUCKLE MNT	2	4380	21	0.04	184					0.03	114
TOTALS						**178**			**17.23**	**54,916**		**191**			**9.33**	**25975**		**9**			**7.89**	**28,941**

Prepared: 8/14/2019