



# **Investment Grade Audit for the Town of Falmouth**

**Revision 1**

**LED Streetlighting Conversion**

**June 05, 2018**

**O-0512**

## **Primary Contact**

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June 05, 2018

Nathan Poore  
Town Manager  
The Town of Falmouth  
271 Falmouth Road  
Falmouth, ME 04105

Dear Mr. Poore,

We are pleased to present this revised Investment Grade Audit (IGA) of the streetlight network for the Town of Falmouth.

We have concluded our detailed analysis of your streetlight system to reflect the proposed upgrade to LEDs based on our GIS/GPS mapping. The existing streetlights to be upgraded to LEDs under the scope of work of the IGA presented are currently consuming 267,890 kWh. By upgrading to LEDs (excluding the 12 new LED light locations), your projected annual energy consumption will fall substantially to 79,202 kWh, resulting in 188,688 kWh of energy savings, equivalent to a 70% reduction in consumption.

The revised IGA report is broken-down in the following method for depicting scenarios as requested as part of this IGA:

- IGA Main Body – Replacement of Complete Inventory (New Cobrahead, Cobrahead, Post Top and Box Top fixtures)
- Appendix A – Cobrahead, Post Top Retrofit and New LED Cobrahead Luminaires

The total project cost for Cobrahead, Post Top Retrofit and New LED Cobrahead Luminaires is \$352,187 including the 12 new luminaires, allowances for rewiring, fusing, and other installation allowances listed in Section 7.2. – Allowances. In addition, this IGA report includes a detailed breakdown of project costs, return on investment, and operating cost savings summarized by fixture type and ownership throughout this document.

The updated report also includes the revised energy supply rate provided by the Town.

We look forward to moving your project to the next phase. We will arrange for a conference call to discuss the contents of this report in the next few days, but until then please feel free to contact us should you have any questions.

Yours truly,



Sean Neely, President  
[sneely@realtermenenergy.com](mailto:sneely@realtermenenergy.com)

## 1. EXECUTIVE SUMMARY

	Title	Town of Falmouth LED Streetlight Conversion			
		Conversion of Central Maine Power Owned Lights	Conversion of Town Owned Lights	Installation of New LED Luminaires + Brackets	Total (Excluding New LED Luminaires)
Technical/ Environmental Assessment	Ownership				
	Baseline	486 HID <sup>(1)</sup> Cobrahead fixtures, 89 HID Decorative fixtures, 575 HID fixtures Total demand: 55.5 kW Annual energy consumption: 236,579 kWh Annual operating hours: 4,260	3 HID Decorative fixtures, 39 HID Area/Flood lights, 42 HID fixtures Total demand: 7.4 kW Annual energy consumption: 31,311 kWh Annual operating hours: 4,260	N/A. Addition of 12 new LED Cobrahead Luminaires and Brackets	486 HID <sup>(1)</sup> Cobrahead fixtures, 92 HID Decorative fixtures, 39 HID Area/Flood lights, 617 HID fixtures Total demand: 62.9 kW Annual energy consumption: 267,890 kWh Annual operating hours: 4,260
	Technology Employed	Smart ready LED Fixtures	Smart ready LED Fixtures	Smart ready LED Fixtures	Smart ready LED Fixtures
	Technology Provider(s)	Acuity Brands	Acuity Brands	Acuity Brands	Acuity Brands
	Technical Specifications	7-PIN, Smart ready fixtures Color temperature: <b>3,000K</b> Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: <b>3,000K</b> Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: <b>3,000K</b> Average life ≥ 100,000 hours	7-PIN, Smart ready fixtures Color temperature: <b>3,000K</b> Average life ≥ 100,000 hours
	Fixture Warranty	10 years	10 years	10 years	10 years
Financial Assessment	Annual Energy Savings	165,923 (70%)	22,765 (73%)	N/A	188,688 (70%)
	Financing Scheme	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)	Capital Purchase (Falmouth-financed)
	LED Streetlight Upgrade Project Cost	\$336,952	\$34,028	\$10,606	\$370,980
	Acquisition Cost <sup>(2)</sup>	\$42,618	N/A	N/A	(\$381,586 including new Lights)
	Total Project Cost	\$379,570	\$34,028	\$10,606	\$413,598
	Incentive from Efficiency Maine	N/A	\$4,280	N/A	\$4,280
	Net Project Cost	\$379,570	\$29,748	\$10,606	\$409,318
	Project Reference Period <sup>(3)</sup>	23 Years	23 Years	23 Years	23 Years
	Payback Period	4.8 Years	8.3 Years	N/A	5.0 Years <sup>(4)</sup>

(1) High Intensity Discharge

(2) Acquisition Cost from Central Maine Power, included for analysis purposes only

(3) The Maine PUC uses 29 years when establishing SL and SE Rates. 23 Years is used in this report as the Luminaire life is 100,000 hours divided by the Operating Hours.

(4) Payback period does not consider the addition of 12 new lights.



## 2. INTRODUCTION

RealTerm Energy has examined in detail the Town of Falmouth's existing streetlight network records to produce this Investment Grade Audit. Our analysis included the following stages:

- Evaluation of existing GPS/GIS data of the entire streetlight inventory of the Town
- Application of appropriate LED-based lighting designs
- Update of the replacement LED fixtures from the desktop review
- Detailed examination of the Town's utility bills
- Detailed examination of the Town's maintenance records
- Establishment of baseline results for energy consumption and maintenance costs
- Revision of estimated project costs and savings potential

A summary of our findings is shown below:

	IGA RESULT
Number of Fixtures	617
Type of Fixture	HPS
Energy Savings (%)	70%
Energy Consumption (kWh)	267,890
Projected Annual Utility Costs	\$95,392
Annual Maintenance <sup>(1)</sup>	\$1,050
Total Annual Operating Cost	\$96,442
Average Annual Operating Cost per Fixture	\$156
LED Lighting Upgrade Project Cost	\$370,980
Acquisition Cost from Central Maine Power	\$42,618
<b>Total Project Cost</b> (includes Acquisition cost from CMP)	\$413,598
Incentives (Efficiency Maine)	<b>\$4,280</b>
<b>Net Project Costs <u>after</u> Incentives</b>	<b>\$409,318</b>

(1) - Accounts only for Town Owned fixtures.

### 3. GPS MAPPING

RealTerm Energy conducted a complete GIS inventory of the Town of Falmouth's streetlights and used the information derived from this review to develop a detailed picture of Falmouth's current streetlighting network, which includes the following:

- Accurate count of all fixtures and fixture types
- Wattage of each existing fixture
- Length of fixture arms, fixture heights, setbacks from roadway, pole spacing, etc.
- Exact GPS coordinates
- Road classifications
- Utility pole ID numbers (when available)

From this data, we established a profile of Falmouth's streetlight inventory and defined key parameters such as demand and energy consumption, thus allowing us to accurately estimate energy savings potential associated with the LED upgrade.

#### 3.1. GIS/GPS Inventory (Actual)

A detailed breakdown of the revised lighting inventory, obtained from the GIS/GPS audit, is presented below:

OWNERSHIP		TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
<b>COBRAHEAD FIXTURES</b>					
CMP		Cobrahead - HPS - 50W	65	211	13.7
CMP		Cobrahead - HPS - 70W	95	203	19.3
CMP		Cobrahead - HPS - 100W	130	53	6.9
CMP		Cobrahead - HPS - 150W	195	17	3.3
CMP		Cobrahead - HPS - 250W	295	1	0.3
CMP		Cobrahead - HPS - 400W	465	1	0.5
		<b>Subtotal (Cobrahead)</b>		<b>486</b>	<b>44.0</b>
OWNERSHIP		TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
<b>DECORATIVE FIXTURES</b>					
CMP		Decorative - Other Post Top - 100W	130	4	0.5
CMP		Decorative - Victorian Lantern Post Top - 100W	130	85	11.1
Town		Decorative - Box Top - 50W	65	3	0.2
Town		Decorative - Box Top - 100W	130	3	0.4
Town		Decorative - Box Top - 150W	180	11	2.0
Town		Decorative - Box Top - 175W	210	13	2.7
Town		Decorative - Other Post Top - 100W	130	1	0.1
Town		Decorative - Victorian Lantern Post Top - 100W	130	2	0.3
Town		Floodlight - 150W	185	9	1.7
		<b>Subtotal (Decorative)</b>		<b>131</b>	<b>18.9</b>
<b>TOTAL</b>				<b>617</b>	<b>62.9</b>

Initials: \_\_\_\_\_



## 4. LED REPLACEMENT INVENTORY

The reduced demand (measured in kW) following the LED streetlight upgrade will directly impact the Town's annual energy consumption, measured in kWh. Our findings show that the demand will be reduced by 44.3 kW (excluding new luminaires). **This will result in energy savings of 70% over the current consumption, equivalent to 188,688 kWh annually.** The table below illustrates the proposed changes to Falmouth's inventory, based on our examination of the GPS data and lighting design results (see next page for more details on our design methodology).

Following input from the Town, our design team developed plans utilizing only 3,000K color temperature fixtures throughout Falmouth.

### 4.1. LED Replacements (one-for-one)

The LED Replacement inventory is summarized in the table below:

TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
<b>COBRAHEAD FIXTURES</b>					
19W_ATBS-A-MVOLT-R2-3K-MP-NL-P7	19	142	DLC Premium	3,000K	2.7
19W_ATBS-A-MVOLT-R3-3K-MP-NL-P7	19	14	DLC Premium	3,000K	0.3
31W_ATBS-C-MVOLT-R2-3K-MP-NL-P7	31	251	DLC Premium	3,000K	7.8
31W_ATBS-C-MVOLT-R3-3K-MP-NL-P7	31	26	DLC Premium	3,000K	0.8
40W_ATBS-E-MVOLT-R2-3K-MP-NL-P7	40	5	DLC Premium	3,000K	0.2
40W_ATBS-E-MVOLT-R3-3K-MP-NL-P7	40	28	DLC Premium	3,000K	1.1
40W_ATBS-E-MVOLT-R3-3K-BZ-MP-NL-P7 (*)	40	1	DLC Premium	3,000K	0.0
60W_ATBS-H-MVOLT-R2-3K-MP-NL-P7	60	5	DLC Standard	3,000K	0.3
60W_ATBS-H-MVOLT-R3-3K-MP-NL-P7	60	14	DLC Standard	3,000K	0.8
170W_ATBL-A-MVOLT-R3-3K-MP-NL-P7	170	1	DLC Standard	3,000K	0.2
<b>Subtotal (Cobrahead)</b>		<b>487</b>			<b>14.2</b>

(\*) One Post Top Luminaire RTE ID: 716 is being Converted to Cobrahead with new Bracket.

TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
<b>NEW COBRAHEAD FIXTURES</b>					
31W_ATBS-C-MVOLT-R2-3K-MP-NL-P7_4FT NEW ARM (New Luminaires)	31	11	DLC Premium	3,000K	0.3
31W_ATBS-C-MVOLT-R3-3K-MP-NL-P7_8FT NEW ARM (New Luminaires)	31	1	DLC Premium	3,000K	0.1
<b>Subtotal (New Luminaires)</b>		<b>12</b>			<b>0.4</b>



TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
<b>DECORATIVE/AREA FIXTURES</b>					
25W_ATB0-10BLEDE70-MVOLT-R2-3K-DDB-MP-NL-UMS-DDB-P7	25	1	DLC Premium	3,000K	0.1
25W_ATB0-10BLEDE70-MVOLT-R4-3K-DDB-MP-NL-UMS-DDB-P7	25	2	DLC Premium	3,000K	0.1
36W_ATB0-20BLEDE53-MVOLT-R4-3K-BK-MP-NL-UMS-BK-P7	36	13	DLC Premium	3,000K	0.4
36W_ATB0-20BLEDE53-MVOLT-R4-3K-BZ-MP-NL-UMS-BZ-P7	36	1	DLC Premium	3,000K	0.1
48W_ATB0-20BLEDE70-MVOLT-R4-3K-BK-MP-NL-P7-BR1060 BK	48	2	DLC Premium	3,000K	0.1
48W_ATB0-20BLEDE70-MVOLT-R4-3K-BK-MP-NL-UMR-BK-P7	48	11	DLC Premium	3,000K	0.5
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL	26	24	No	3,000K	0.6
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL_HSS	26	58	No	3,000K	1.4
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL_HSS_4IN tenon adaptor	26	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL_4IN tenon adaptor	39	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL_HSS	39	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R3_P7_NL	39	1	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL	39	2	No	3,000K	0.1
79W_ACP0LED-PK2-MVOLT-FL-30K-TM-BZSDP-10KVMP-PER7-NL	79	9	DLC Premium	3,000K	0.7
<b>Subtotal (Decorative)</b>		<b>130</b>			<b>4.4</b>
<b>TOTAL</b>		<b>617</b>			<b>18.6<sup>(*)</sup></b>

(\*) Demand of new fixtures not included.

\*DLC-listed products are LED products that have been tested at a DLC-approved laboratory and comply with specified performance and energy efficiency criteria. These products are eligible for the Efficiency Maine incentive. For further information please visit the DesignLights Consortium website at [www.designlights.org](http://www.designlights.org).

Only fixtures mounted on non-utility poles and that are 'DLC Premium' are eligible for the Efficiency Maine Incentive. Please note that in the table above, 15 different types of light fixtures are not eligible for Efficiency Maine's incentives as they are either non-DLC Premium listed or they are mounted on utility poles. We have chosen these lights and are recommending them to you because in our professional opinion they are of equivalent quality and energy efficiency to DLC-listed lights and have been subject to the same type of independent testing. Because they are made in smaller quantities, the manufacturer has simply not paid to submit them to the DLC list.



## 5. LED LIGHTING DESIGN

Upon reviewing the collected geospatial dataset, RealTerm Energy's technical evaluation team formulated a hybrid approach to completing the roadway designs for Falmouth. After evaluating the configuration of each light fixture for existing wattage, road classification, pedestrian activity, pole spacing, mounting height, arm length and curb setback, we have concluded that the Town can achieve the same or better lighting levels than those emitted by its current streetlights. We have implemented a design solution of selected LED luminaires that utilizes RP-8-2014 recommendations as a guideline. These recommendations were followed where possible within the existing infrastructure configuration and without increasing the existing light levels (RP-8 is a recommended, though not required, practice for roadway illumination).

Our design solution was guided by Falmouth staff and the existing general light levels while taking inconsistent areas into consideration to improve consistency. The reason that many of Falmouth's luminaires do not meet RP-8 guidelines may be due to several factors, including:

- Inadequate Pole Spacing (poles are spaced too far apart),
- Missing Light Fixtures (at essential locations to eliminate gaps).

**Our analysis concludes that in all instances where RP-8 could not be achieved with a new LED fixture, this was already the case for the existing fixture.** In such instances, photometric design has been utilized to select an LED luminaire for which the wattage and distribution pattern combine to meet or exceed the existing lighting levels.

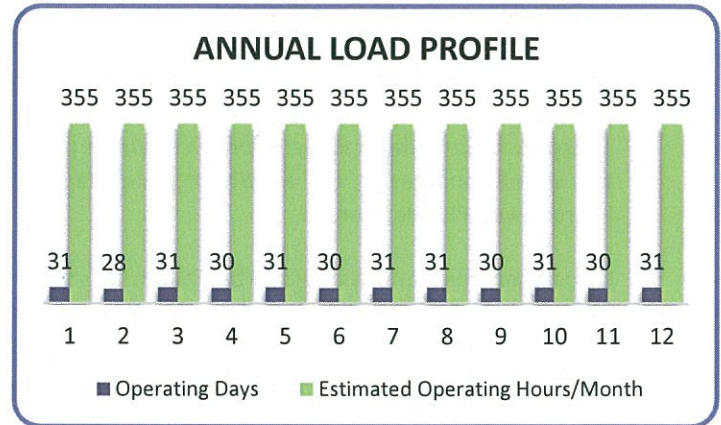
Based on the replacement luminaires (excluding new luminaires) detailed in the following pages, we anticipate that the impact on the Town's annual energy consumption will be as follows:

PARAMETER	IGA Results	%
Current Annual Energy Consumption (kWh)	267,890	
Projected LED Annual Energy Consumption (kWh)	79,202	
Annual Savings (kWh)	188,688	70%

## 6. ENERGY AND COST SAVINGS ANALYSIS

### 6.1. Central Maine Power's Load Profile

Streetlights are generally not metered, but rather deemed to be 'on' and are therefore billed based on a load profile determined by the Utility. The annual load profile is a critical part of the Baseline calculation, used to project the actual energy consumption and future energy savings that will be realized after the upgrade. The load profile utilized by Central Maine Power (CMP), Falmouth's Utility Company, appears on the right. These hours are applicable to both of Central Maine Power's tariff structures, SL-Full Service Lighting and SL-Delivery-Only Service Lighting.



### 6.2. Baseline Energy Calculations

CMP, under the SL-Delivery-Only Service Lighting tariff, will bill the Town only for the consumption incurred during each period, thus applying only variable costs (distribution and supply charges). Facility charges, post acquisition of lights from CMP, will disappear from the Utility Bill.

	Fixed Fees (Facility Charges) <sup>(1)</sup>	Variable Fees (Delivery / Supply)	Total Utility Cost
Before	\$62,478	\$32,914	\$95,392
After	\$0	\$9,731	\$9,731
Savings			\$85,661

(1) – Before upgrade, facility charges include maintenance of the Central Maine Power-owned streetlight system. Any maintenance costs incurred by the Town are not included in the above.



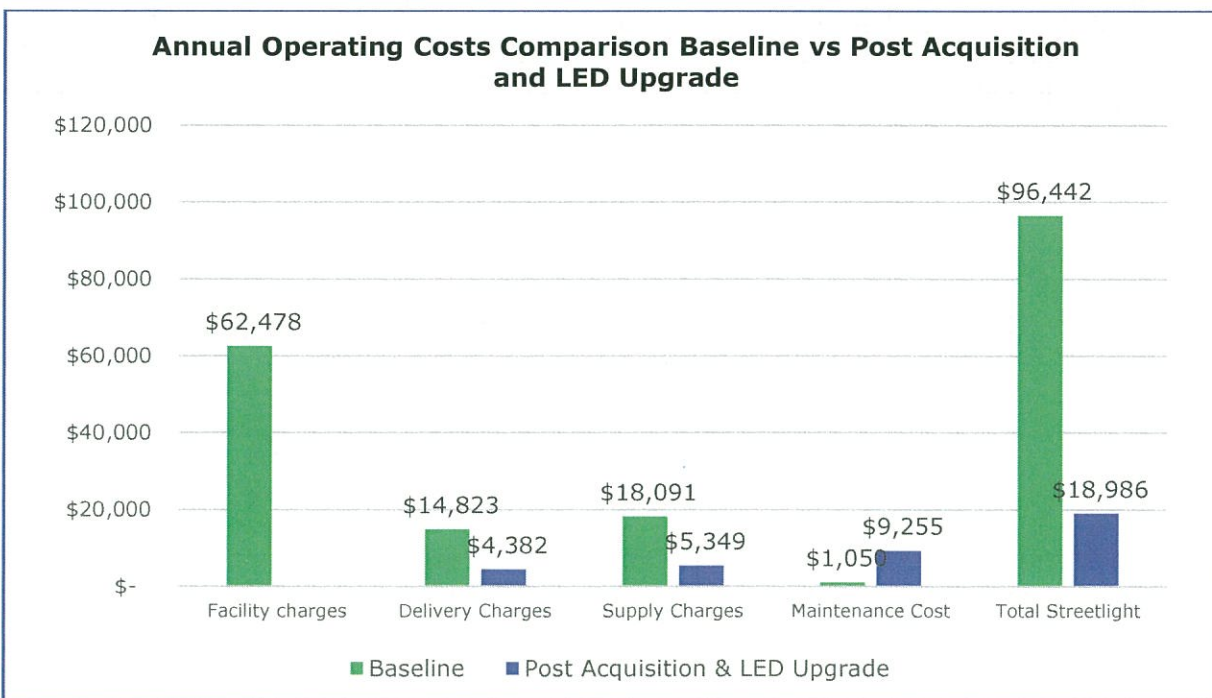
### 6.3. Baseline Maintenance Analysis

The existing streetlight maintenance is included under CMP's SL-Full Service Lighting tariff for company-owned equipment. Following acquisition, the Town of Falmouth will be responsible for the maintenance of the streetlight inventory. We have assumed the ongoing LED streetlight maintenance cost will be approximately \$1.25/fixture/month in year 1. This represents a yearly average of approximately \$9,255 (excluding new lights) for the complete inventory to be upgraded as part of this IGA's Scope of Work.

### 6.4. Energy and Maintenance Cost Comparison

PARAMETER <sup>(1)</sup>	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
<b>Number of Fixtures</b>	<b>617</b>	<b>617</b>		
<b>Annual Electricity Consumption (kWh)</b>	<b>267,890</b>	<b>79,202</b>	<b>188,688</b>	<b>70%</b>
CMP Facility Charges (*)	\$62,478	\$-	\$62,478	N/A
Delivery Charges	\$14,823	\$4,382	\$10,440	70%
Supply Charges	\$18,091	\$5,349	\$12,742	70%
Annual Maintenance Cost	\$1,050	\$9,255	\$(8,205)	N/A
<b>Total Streetlights Expenditures</b>	<b>\$96,442</b>	<b>\$18,986</b>	<b>\$77,456</b>	<b>80%</b>
<b>Average Annual Cost per Fixture</b>	<b>\$156</b>	<b>\$31</b>	<b>\$126</b>	<b>80%</b>

(\*) Included for entire inventory acquired from CMP.



## 6.5. Operating Costs Breakdown by Fixture Type:

Fixture Type	Qty (Town owned)	Baseline						Post Acquisition and LED Upgrade						Operation Cost Savings
		Energy (kWh)	Energy Supply Cost (\$0.06753 / kWh)	Delivery Service Costs (\$0.055332 / kWh)	CMP Facility Charges	Estimated Maintenance Town Owned (\$25/Fixture/Year)	Total	Qty	Energy (kWh)	Energy Supply Cost (\$0.06753 / kWh)	Delivery Service Costs (\$0.055332 / kWh)	Estimated Maintenance Town Owned (\$1.25/fixture/month)	Total	
Cobraheads	486 (0)	187,291	\$12,648	\$10,363	\$52,519	\$0	\$75,530	487	60,581	\$4,091	\$3,352	\$7,305	\$14,748	80%
Box Tops & floods	39 (39)	29,650	\$2,152	\$1,763	\$0	\$975	\$4,890	39	8,154	\$551	\$451	\$585	\$1,587	68%
Post Tops	92 (3)	50,950	\$3,291	\$2,697	\$9,959	\$75	\$16,022	91	10,467	\$707	\$579	\$1,365	\$2,651	83%
<b>Total</b>	<b>617 (42)</b>	<b>267,890</b>	<b>\$18,091</b>	<b>\$14,823</b>	<b>\$62,478</b>	<b>\$1,050</b>	<b>\$96,442</b>	<b>617</b>	<b>79,202</b>	<b>\$5,349</b>	<b>\$4,382</b>	<b>\$9,255</b>	<b>\$18,986</b>	<b>80%</b>

\* This table does not include the 12 new LED Cobrahead fixtures



## 7. PROJECT COSTS

### 7.1. Project Costs, Savings and Investment Return

In a Capital Purchase financing option, or a "Design, Upgrade and Transfer", the Town arranges the financing of the project.

PROJECT COSTS	QTY / PRICE
Number of Fixtures	<b>617</b> (629 including 12 new Luminaires)
LED Streetlight Upgrade Project Cost	\$370,980 (\$381,586 including 12 new Luminaires)
Acquisition Cost from CMP	\$42,618
Total Project Cost	<b>\$413,598</b> (\$424,204 including 12 new Luminaires)
Incentive from Efficiency Maine	<b>\$4,280</b>
Net Project Costs	<b>\$409,318</b> (\$419,924 including 12 new Luminaires)

The total estimated project cost is inclusive of a 17% RTE margin on the costs for the procurement of fixtures and installation-related charges. In addition, the estimated project cost includes a charge of \$10.50 per fixture for data collection and the preparation of an Investment Grade Audit (IGA).

**Note regarding the available incentives:**

The above incentive amount has been calculated using the current Efficiency Maine guidelines for LED Outdoor Area Fixture and LED Flood & Spot Light. These prescriptive amounts may vary based on approval and availability of funding.

## INVESTMENT RETURN

The estimated payback period of the project, including acquisition from Central Maine Power, before including any financing costs is **5.0 years** (excluding 12 new Luminaires).

### 7.1. 10 Year Cash Flow

#### Annual Net Savings over 10-year

Year	0	1	2	3	4	5	6	7	8	9	10
Initial Investment	\$413,598	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Annual Savings	\$0	\$77,456	\$79,862	\$82,341	\$84,897	\$87,531	\$90,246	\$93,044	\$95,927	\$98,899	\$101,963
Cumulative Net Savings	(\$413,598)	(\$336,142)	(\$256,280)	(\$173,939)	(\$89,042)	(\$1,511)	\$88,735	\$181,779	\$277,706	\$376,605	\$478,568

As shown above, this project is cashflow positive from the onset with significant net savings.

## 7.2. Allowances

The total project cost includes provisional allowances as detailed below:

Provisional Items	Utility Portion				Town Owned Portion		New Lights	
	Cobraheads		Post Tops		Decorative and Other		Cobraheads	
	%	Quantity	%	Quantity	%	Quantity	%	Quantity
Wiring	20%	97	5%	5	5%	2	100%	12
Fusing	100%	486	100%	91	100%	40	100%	12
Fuse Holder Replacement	100%	486	100%	91	100%	40	100%	12
Arms (new or replacement)	2%	10					100%	12
Traffic Management	100%	486	100%	91	100%	40	100%	12

### Billing of Provisional Items

The work covered by the allowances listed above are recommended as they will minimize the likelihood of service calls over the life of the fixtures, greatly reducing maintenance costs. Following the installation phase, should fewer than the estimated provisional amounts be required (rewiring, refusing, arm replacement, etc.), the costs shall be adjusted in the final billing, based on actual work performed. During the installation phase, if additional work is required, the Town will be notified first before allowances are exceeded. Any additional work must first be authorized by the municipality and will be handled as a change order.

### Luminaires near high voltage wires within a restricted zone:

In the case of Cobrahead fixtures located near high voltage wires within a restricted zone, we identify 3 different approaches to address and solve the issue while ensuring safety. The exact quantity of the fixtures located within the restricted zone can only be identified in the installation phase.

1. Safety is always the number one priority, and to that end, we will assess each location with the goal of relocating the affected luminaire to a safe location. This may involve the services of an engineer and additional costs imposed by CMP both of which will become a pass-through to the Town. However, we anticipate that there is a return to the Town through lower maintenance costs (fewer service calls) for the luminaire in the future.
2. Engage the services of high voltage crews to replace the existing luminaires, however, this comes at a premium price. This option is not recommended, as it does not solve any future access issues.
3. RealTerm Energy supplies the fixtures only (uninstalled), and the Town can work in conjunction with the local utilities to organize the installation.

If, during the installation, we find luminaires near high tension wires within a restricted zone, we will work with your municipal staff to determine which approach the Town prefers.



## 8. CALCULATION ASSUMPTIONS

1. The electricity consumption and cost savings were calculated based on CMP's current rates valid at the date of the preparation of this report. This information can be obtained online from CMP's pricing schedules<sup>1</sup>. Any changes in the data obtained will change the energy consumption and cost savings depicted in this report.

Item	Baseline	Post-Upgrade
Number of Fixtures	617	629
Fixture Ownership	Central Maine Power	Town of Falmouth
Tariff	SL-Full Service Lighting	SL-Delivery-Only Service Lighting
Annual Operating Hours	4,260	4,260
Annual Luminaire, Lamp and Facility Charges	Annual Facility Charges as per SL-Full Service Lighting	N/A
Electricity Delivery Charges	\$0.055332 / kWh	\$0.055332 / kWh
Electricity Supply Charges	\$0.06753 / kWh From First Point Power LLC	\$0.06753 /kWh From First Point Power LLC
Maintenance Cost	Estimated based on \$25.00/Fixture/year Only for the Town-owned portion	Estimated based on \$15.00/Fixture/year

2. We have assumed that the Efficiency Maine Commercial & Industrial Prescriptive Incentive Program Lighting Solutions for Interior and Exterior will continue to be in effect, using the currently published rates, which would help us to avoid any delays in receiving these incentives. While we will do everything we can to meet the requirements of these programs and to gain the incentives for the Town. RealTerm Energy cannot take responsibility for those aspects which are outside of its control.
3. An acquisition cost of \$42,618 from CMP was provided by the Town and is included in our calculation for analysis purposes only.
4. After the first year, the energy and maintenance costs' inflation rates are 3% and 2%, respectively.

Initials: \_\_\_\_\_

<sup>1</sup> Central Maine Power Pricing Schedules: <https://www.cmpco.com/YourHome/pricing/pricingSchedules/default.html>

## 9. CONCLUSION AND RECOMMENDATIONS

We have implemented a designed solution of selected LED luminaires that conforms to the light levels acceptable to the Town of Falmouth guided by the RP-8-2014 guidelines where applicable.

If the Town of Falmouth chooses to move forward with the Design, Upgrade and Transfer option, the total project cost, including acquisition, will be approximately \$413,598 (or \$424,204 including new lights). The Town should expect a payback period of approximately 5.0 years (excluding new lights).

The next steps to start the implementation of this new technology and to start seeing energy and maintenance savings are as follows:

- Meeting to review IGA with staff and RealTerm Energy team
- Approval of the IGA
- Submit Energy Efficiency rebates
- Proceed with project installation phase



## 10. TERMS AND CONDITIONS

The total project cost includes the following scope of work:

1. Data collection, including GIS/GPS mapping of the existing and proposed luminaires
2. Photometric Lighting Designs
3. Remove 486 existing HID Cobrahead luminaires and supply and install 486 Cobrahead LED luminaires with photocell controllers
4. Remove 1 existing HID Decorative Post Top luminaire and supply and install 1 Cobrahead LED luminaire with photocell controllers and new bracket.
5. Supply and Install 12 New Cobrahead LED luminaires on existing poles, with photocell controllers and new bracket
6. Remove 130 existing HID Decorative and Area luminaires and supply and install 130 Decorative/Area LED luminaires with photocell controllers
7. All provisions and allowances detailed in Section 7.2 – Allowances.
8. Cobrahead and Post Top LED Fixtures to be installed under CMP Terms and Conditions Section 53. The project cost includes the supply and installation of 590 SICAME Fusing KIT FTC25SCO 2L300N10A.
9. CMP to bill Connection fees under CMP Terms and Conditions Section 53 for the entire Cobrahead inventory and the Post Luminaires within the scope of work. In addition, the project cost includes 16 Hours of CMP project management fees for new Cobrahead fixtures and Post Tops fusing.
10. Fixture ownership labels for the complete Cobrahead streetlight inventory within the Scope of Work.
11. Supply only of 10 DIM4-CD Dimulators.
12. Permits and inspection of work
13. Recycling of the removed HID luminaires
14. Project management
15. The Town's GIS database will be updated once installation is complete to include final LED inventory installed, date, type, location, etc.
16. Completing billing change(s) on your behalf based on the new LED lighting system installed by RealTerm Energy and based on the information provided by the Town and the Utility regarding metered and unmetered lights. RealTerm Energy assumes that the information provided by both parties is accurate and reflects the current state of the actual inventory
17. Third party quality control for a sample of 20 luminaires. Based upon this sample, should further action be required to correct any deficiencies observed in the installation, remedial work and any associated costs shall be borne by the installer.
18. Commissioning

Initials: \_\_\_\_\_

19. Applying on your behalf for the available Efficiency Maine incentives. The final incentive amount will be determined by Efficiency Maine and is not guaranteed by RealTerm Energy
20. RealTerm Energy and our Installation Contractors warrant all workmanship completed within the work area for a period of one (1) year following the completion date of the installation
21. The Luminaire and Photocell are covered by their manufacturers' warranties for 10 and 12 years, respectively
22. For analysis purposes, the signed change order as per contract 00000806 issued May 30<sup>th</sup>, 2017 for a value of \$2,900 for Professional Services for reviewing existing streetlight designs, and providing recommendations with new photometric designs, is included on this IGA
23. Police details have not been included on this IGA. If required for traffic management, these costs will be billed as a pass through to the Town based on the Contractor's price.
24. This IGA is valid until July 31, 2018.
25. The total project cost is in USD and does not include any applicable taxes.

The scope of work set forth herein shall constitute the sole and entire scope of work for the Project and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to the scope of work. For greater clarity, this IGA amends and supplements in its entirety that certain Agreement effective as of September 29, 2016 by and between the Town of Falmouth Maine and Realterm Energy US, L.P. (the "Agreement") solely with respect to the scope of work. In the event of any conflict between this IGA and the Agreement, the terms of this IGA shall prevail. The Parties have not relied on any statement, representation, warranty or agreement of the other Party or of any other person acting on such Party's behalf, including any representations, warranties, or agreements arising from statute or otherwise in law, except for the representations, warranties, or agreements expressly contained in this IGA. Without limitation of the foregoing, the parties acknowledge and agree that the following items are not included in the scope of work, nor the total project cost:

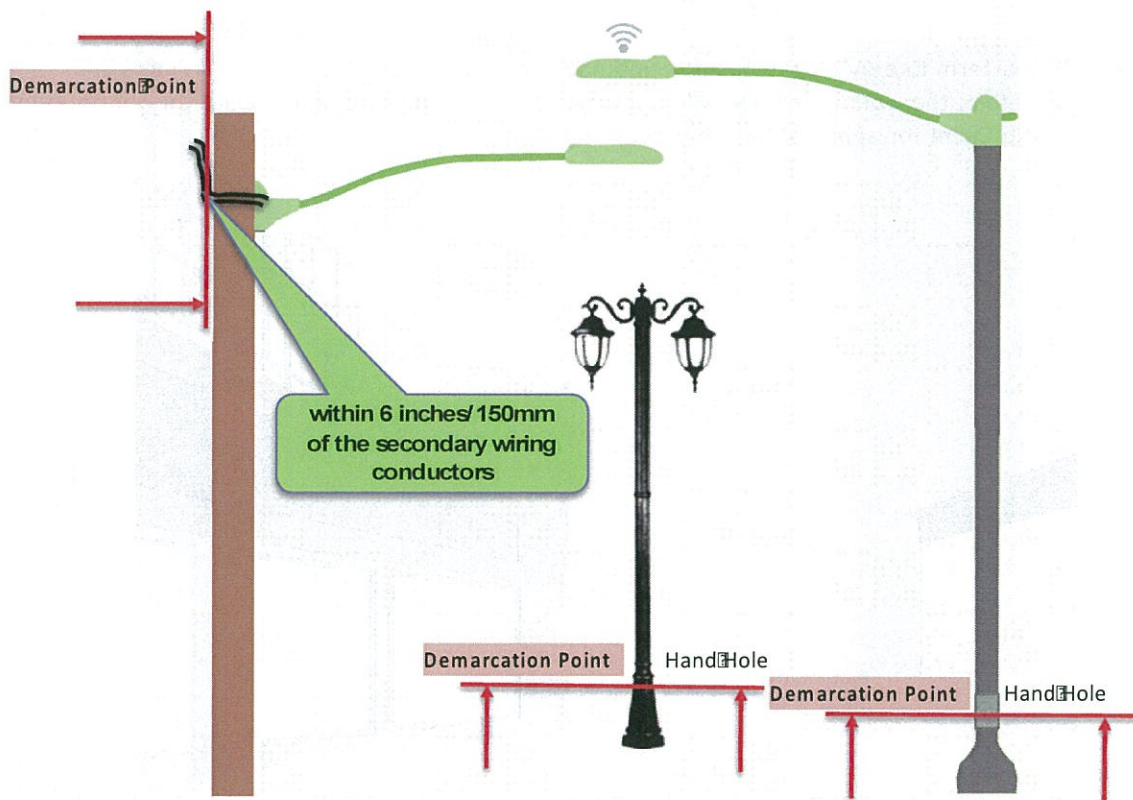
1. Any cost related to upgrading your existing lighting/electrical systems to provincial and/or federal standards.
2. Any cost related to the replacement of the existing relays for the group-controlled streetlights (controller box).
3. Any fees related to the connections to the secondary bus in the unlikely case that CMP insists on charging a fee.
4. Any other fees which may be charged by a third party.
5. Any costs related to works beyond the Demarcation Point, described as follows:
  - Work performed on the electrical system by RealTerm Energy will be confined to the Luminaire and an area between the agreed upon "*Demarcation Point*" (in the majority of cases, a point within 6 inches/150mm of the secondary wiring conductors) on what is referred to as the "Tail". This is the location at which a Fuse and Fuse Holder should exist and acts as a disconnect to allow easy service, protect the new luminaire and wiring from voltage surges and provide a safe working environment. In the event that a Fuse and Fuse Holder do not exist, they will be installed.

Initials: \_\_\_\_\_



- For decorative poles and stand-alone underground fed units, the "*Demarcation Point*" is located at the base of the pole in the "Hand Hole". Where overhead feeds are in use, the "*Demarcation Point*" is located at the base of the arm holding the fixture, where the connection is made to the secondary wires.
- If RealTerm Energy dispatches a maintenance contractor and the required repairs are outside of the work areas, we will recommend a solution and communicate this information to the Client for approval before proceeding.

## 11. SCOPE OF WORK DIAGRAM



The foregoing excluded items and any other items not included within the scope of work may be provided by RealTerm Energy at an additional cost pursuant to a separate written agreement or amendment between the parties only. The above list of exclusions is not meant to be exhaustive, as network site conditions may vary, and shall not operate in any way to limit the exclusions of this paragraph or imply any obligation or duty on the part of RealTerm Energy to complete any work other than the specifically defined scope of work set forth herein.



Nathan Poore  
271 Falmouth Road  
Falmouth, ME 04105

The information contained herein will form part of the Installation contract documents as well as the Scope of Work for the LED Streetlighting conversion project. The undersigned is authorized to sign on behalf of the municipality and accepts the terms and conditions of this Investment Grade Audit report titled "O-0512\_IGA Report\_Falmouth-ME\_2018-06-05".

Please review and acknowledge by initializing the following sections:

- CALCULATION ASSUMPTIONS
  - Page 15 (applicable to complete inventory)
- TERMS & CONDITIONS
  - Pages 17, 18 & 19

Please review and initial the option the Town would like included within the project's scope of work. Any option(s) not initialed will be excluded from the scope of work.

- LED REPLACEMENT INVENTORY
  - Pages 7 & 8 for Complete Inventory
  - Page 23 & 24 for Cobraheads and Post Top and New Cobrahead Luminaires Option
- PROJECT COSTS
  - Pages 13 & 14 for Complete Inventory
  - Pages 25 for Cobraheads and Post Top and New Cobrahead Luminaires Option



Authorized Signature



Name (please print)



Title (please print)



Date

## APPENDIX A: COBRAHEAD, POST TOP AND NEW COBRAHEAD LUMINAIRES



## Existing Inventory

OWNERSHIP		TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
COBRAHEAD FIXTURES					
CMP		Cobrahead - HPS - 50W	65	211	13.7
CMP		Cobrahead - HPS - 70W	95	203	19.3
CMP		Cobrahead - HPS - 100W	130	53	6.9
CMP		Cobrahead - HPS - 150W	195	17	3.3
CMP		Cobrahead - HPS - 250W	295	1	0.3
CMP		Cobrahead - HPS - 400W	465	1	0.5
		<b>Subtotal (Cobrahead)</b>		<b>486</b>	<b>44.0</b>
OWNERSHIP		TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
DECORATIVE FIXTURES					
CMP		Decorative - Other Post Top - 100W	130	4	0.5
CMP		Decorative - Victorian Lantern Post Top - 100W	130	85	11.1
Town		Decorative - Other Post Top - 100W	130	1	0.1
Town		Decorative - Victorian Lantern Post Top - 100W	130	2	0.3
		<b>Subtotal (Decorative)</b>		<b>91</b>	<b>11.9</b>
<b>TOTAL</b>				<b>578</b>	<b>55.9</b>

## LED Replacements (Actual, Post-Upgrade)

TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
COBRAHEAD FIXTURES					
19W_ATBS-A-MVOLT-R2-3K-MP-NL-P7	19	142	DLC Premium	3,000K	2.7
19W_ATBS-A-MVOLT-R3-3K-MP-NL-P7	19	14	DLC Premium	3,000K	0.3
31W_ATBS-C-MVOLT-R2-3K-MP-NL-P7	31	251	DLC Premium	3,000K	7.8
31W_ATBS-C-MVOLT-R3-3K-MP-NL-P7	31	26	DLC Premium	3,000K	0.8
40W_ATBS-E-MVOLT-R2-3K-MP-NL-P7	40	5	DLC Premium	3,000K	0.2
40W_ATBS-E-MVOLT-R3-3K-MP-NL-P7	40	28	DLC Premium	3,000K	1.1
40W_ATBS-E-MVOLT-R3-3K-BZ-MP-NL-P7 (*)	40	1	DLC Premium	3,000K	0.0
60W_ATBS-H-MVOLT-R2-3K-MP-NL-P7	60	5	DLC Standard	3,000K	0.3
60W_ATBS-H-MVOLT-R3-3K-MP-NL-P7	60	14	DLC Standard	3,000K	0.8
170W_ATBL-A-MVOLT-R3-3K-MP-NL-P7	170	1	DLC Standard	3,000K	0.2
<b>Subtotal (Cobrahead)</b>		<b>487</b>			<b>14.2</b>

(\*) One Post Top Luminaire RTE ID: 716 is being Converted to Cobrahead with new Bracket.

Initials: NP

TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
<b>NEW COBRAHEAD FIXTURES</b>					
31W_ATBS-C-MVOLT-R2-3K-MP-NL-P7_4FT NEW ARM (New Luminaires)	31	11	DLC Premium	3,000K	0.3
31W_ATBS-C-MVOLT-R3-3K-MP-NL-P7_8FT NEW ARM (New Luminaire)	31	1	DLC Premium	3,000K	0.1
<b>Subtotal (New Luminaires)</b>		<b>12</b>			<b>0.4</b>

TYPE	WATTAGE	QTY	DLC	Color Temperature	DEMAND (kW)
<b>DECORATIVE/AREA FIXTURES</b>					
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL	26	24	No	3,000K	0.6
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL_HSS	26	58	No	3,000K	1.4
26W_247CL_10LEDE70_MVOLT_3K_R3_P7_NL_HSS_4IN tenon adaptor	26	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL_4IN tenon adaptor	39	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL_HSS	39	2	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R3_P7_NL	39	1	No	3,000K	0.1
39W_247CL_10LEDE10_MVOLT_3K_R5_P7_NL	39	2	No	3,000K	0.1
<b>Subtotal (Decorative)</b>		<b>91</b>			<b>2.5</b>
<b>TOTAL</b>		<b>578</b>			<b>16.7</b>

Initials: NP



**Project Cost: Capital Purchase**

PROJECT COSTS	
<b>Number of Fixtures</b>	578
LED Streetlight Upgrade Project Cost	\$341,582
Acquisition Cost from CMP	\$42,618
<b>Total Project Cost</b>	<b>\$384,200</b>
New Cobrahead Luminaires	12
<b>New Luminaire Project Cost</b>	<b>\$10,606</b>
<b>Total Upgrade Project Cost (including New Cobrahead Luminaires and excluding acquisition from CMP)</b>	<b>\$352,187</b>

Total project cost above includes the RTE Fee of \$10.50 per fixture for data collection and the preparation of an Investment Grade Audit (IGA). and change order for Professional Services for reviewing existing streetlight designs, and providing recommendations with new photometric designs. The Total project cost includes the Allowances listed in Section 7.2 – Allowances.

**Investment Return**

The payback period of the project before including any financing costs is **4.9** years (this does not include the new Luminaires).

Year	0	1	2	3	4	5	6	7	8	9	10
Initial Investment	\$384,200	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Annual Savings</b>	<b>\$0</b>	<b>\$74,425</b>	<b>\$76,744</b>	<b>\$79,134</b>	<b>\$81,597</b>	<b>\$84,136</b>	<b>\$86,753</b>	<b>\$89,451</b>	<b>\$92,231</b>	<b>\$95,097</b>	<b>\$98,051</b>
Cumulative Net Savings	(\$384,200)	(\$309,775)	(\$233,031)	(\$153,897)	(\$72,300)	\$11,836	\$98,589	\$188,040	\$280,271	\$375,368	\$473,419

Annual Net Savings over 10-year

As shown above, this project is cashflow positive from the onset with significant net savings.

**Energy and Maintenance Cost Comparison**

PARAMETER <sup>(1)</sup>	BEFORE UPGRADE	POST UPGRADE	VARIANCE	PERCENT
<b>Number of Fixtures</b>	<b>578</b>	<b>578</b>		
<b>Annual Electricity Consumption (kWh)</b>	<b>267,890</b>	<b>79,202</b>	<b>188,688</b>	<b>70%</b>
CMP Facility Charges (*)	\$62,478	\$-	\$62,478	N/A
Delivery Charges	\$13,182	\$3,931	\$9,251	70%
Supply Charges	\$16,088	\$4,798	\$11,290	70%
Annual Maintenance Cost	\$75	\$8,670	(\$8,595)	N/A
<b>Total Streetlights Expenditures</b>	<b>\$91,824</b>	<b>\$17,399</b>	<b>\$74,425</b>	<b>81%</b>
<b>Average Annual Cost per Fixture</b>	<b>\$159</b>	<b>\$30</b>	<b>\$129</b>	<b>81%</b>

(\*) Included for entire inventory acquired from CMP.

## APPENDIX B: PROJECT PRICE BREAKDOWN BY FIXTURE TYPE



**Project Price Breakdown per Fixture Type:**

The below table shows the project cost breakdown and the payback period per Fixture Type.

Fixture Type	Qty	Material Costs	Installation Cost	RTE Fees	Total	Acquisition Costs	Total Project Cost	Incentive	Net Project Costs	Payback Period <sup>(1)</sup>
Cobrahead	487	\$87,288	\$123,165	\$55,287	\$265,740	\$36,133	\$301,873	\$80	\$301,793	4.7
Box Tops	39	\$11,344	\$13,057	\$4,998	\$29,399	\$0	\$29,399	\$4,200	\$25,199	7.6
Post Tops	91	\$42,247	\$20,701	\$12,893	\$75,841	\$6,485	\$82,326	\$0	\$82,326	5.6
New Cobrahead Luminaires	12	\$2,122	\$6,681	\$1,803	\$10,606	\$0	\$10,606	\$0	\$10,606	N/A
<b>ALL</b>	<b>629</b>	<b>\$143,001</b>	<b>\$163,604</b>	<b>\$74,981</b>	<b>\$381,586</b>	<b>\$42,618</b>	<b>\$424,204</b>	<b>\$4,280</b>	<b>\$419,924</b>	<b>N/A</b>
ALL (excluding New Lights)	617	\$140,878	\$156,924	\$73,178	\$370,980	\$42,618	\$413,598	\$4,280	\$409,318	5.0

(1) Payback periods were calculated including the acquisition cost from CMP (if applicable).


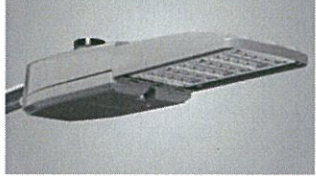


**Note:** The total project costs may increase if the fixtures are not converted in the same time due to higher mobilization and demobilization costs.

## APPENDIX C: SITE SPECIFIC LUMINAIRE REPLACEMENTS



## Site Specific Luminaire Replacements

Type	Qty	Replacement	Before	After
Cobraheads				
Cobrahead	485	Acuity ATBS		
Cobrahead	1	Acuity ATBL		
Cobrahead	12	Acuity ATBS	New Luminaire	
Post Tops				
Post Top	91	Acuity 247CL		
Other Decorative	1	Acuity ATBS		

Type	Qty.	Replacement	Before	After
Box Tops				
Box Top	30	Acuity ATB0		
Floodlight	9	Acuity ACPOLED		

(1) The above images are only for illustration purposes.



## APPENDIX D: LUMINAIRE SPEC SHEETS

- The Luminaire Spec Sheets are attached within the electronic zip file.

## APPENDIX E: LUMINAIRE PRODUCT WARRANTY

- The Luminaire warranty documents are attached within the electronic zip file.



## APPENDIX F: PROJECT COST BREAKDOWN

- The Project Cost Breakdown excel spreadsheet is attached within the electronic zip file.

## APPENDIX G: LIGHTING DESIGN LAYOUTS

- The design layouts of the proposed LED luminaires are attached within the electronic zip file.



## APPENDIX H: PRELIMINARY AUDIT REPORT

- The preliminary Audit Report is attached within the electronic zip file for reference purposes.

## APPENDIX I: STREETLIGHT INVENTORY

- The streetlight inventory Excel file and KMZ map are attached within the electronic zip file.