

**SUBSTITUTE NO. 1 TO ORDINANCE NO. 19-030**

**AN ORDINANCE TO AUTHORIZE AN ENERGY PERFORMANCE CONTRACT FOR LED STREET LIGHTING BETWEEN THE CITY OF WILMINGTON AND SEIBERLICH TRANE ENERGY SERVICES**

**Rev. 1  
#4667**

**Sponsor:**

**Council  
Member  
Turner**

**WHEREAS**, pursuant to Sections 2-308 and 8-200 of the City Charter, the City of Wilmington is authorized to enter into contracts for the supply of property or the rendering of services for a period of more than one year if approved by City Council by ordinance; and

**WHEREAS**, the City desires to obtain LED street lighting system in order to reduce future capital and operating costs; and

**WHEREAS**, a LED street lighting system will have better reliability and life expectancy than the City's current street lighting system, will enhance public safety efforts by providing better visibility to police, fire and paramedics, and will reduce outages; and

**WHEREAS**, the new LED street lighting system will have a smart wireless controls network that will self-report any outages resulting in faster response times for street light maintenance and will be able to expand to incorporate other future smart technologies; and

**WHEREAS**, the LED street lighting system is a smart wireless network that will be an integral part of making Wilmington a "Smart City"; and

**WHEREAS**, the new LED street lighting system will provide substantial energy cost savings to the City because it will use approximately seventy percent (70%) less electricity than the City's current street lighting system, and the new LED lights have a ten-year warranty and average life expectancy of twenty (20) years; and

**WHEREAS**, the Delaware Department of Natural Resources and Environmental Control ("DNREC") will finance through debt servicing the entire capital expense for the City's upgrade to a LED street lighting system; and

**WHEREAS**, the annual cost savings of upgrading to and utilizing a LED street lighting system will be greater than the debt servicing obligations to DNREC; and

**WHEREAS**, the City desires to enter into an energy services contract for a LED street lighting system (the “Contract”), in accordance with 29 *Del. C.* §§ 6971-6976, with Seiberlich Trane Energy Services; and

**WHEREAS**, the term of the Contract is for twenty (20) years from July 1, 2019 to June 30, 2039, at an estimated total price of Two Million, Two Hundred Ninety-Four Thousand, Eight Hundred Eighty-Three Dollars (\$2,294,883.00); and

**WHEREAS**, the City intends to apply to DNREC for an Efficient Energy Investment Fund Grant in the amount of One Hundred Seventy-Three Thousand, Two Hundred Dollars (\$173,200.00), which, if approved by City Council and received from DNREC, would reduce the total estimated cost of the Contract to Two Million, One Hundred Twenty-One Thousand, Six Hundred Eighty-Three Dollars (\$2,121,683.00); and

**WHEREAS**, it is the recommendation of the Department of Public Works that the City enter into the Contract.

**NOW, THEREFORE, THE COUNCIL OF THE CITY OF WILMINGTON HEREBY ORDAINS:**

**SECTION 1.** The Contract between the City and Seiberlich Trane Energy Services, a copy of which, in substantial form, is attached hereto as Exhibit “A”, for the period of twenty (20) years commencing on July 1, 2019, at an estimated total price of Two Million, Two Hundred Ninety-Four Thousand, Eight Hundred Eighty-Three Dollars (\$2,294,883.00), is hereby approved, and the City is hereby authorized and directed to execute as many copies of said Contract, as well as all additional undertakings related thereto, as may be necessary.

**SECTION 2.** This Ordinance shall be effective upon its passage by City Council and approval by the Mayor.

First Reading.....June 6, 2019  
Second Reading.....June 6, 2019  
Third Reading.....January 16, 2020

Passed by City Council,

\_\_\_\_\_  
President of City Council

ATTEST: \_\_\_\_\_  
City Clerk

Approved this \_\_\_\_ day of \_\_\_\_\_, 2020.

\_\_\_\_\_  
Mayor

**SYNOPSIS:** This Ordinance authorizes the City to enter into a twenty-year energy performance contract (the “Contract”) for upgrading the City’s existing street lights to a new, smart technology LED street light system beginning on July 1, 2019 at an estimated total price of Two Million, Two Hundred Ninety-Four Thousand, Eight Hundred Eighty-Three Dollars (\$2,294,883). The Contract will enable the City to realize a long-term energy efficiency by reducing the energy consumption of the City’s street lighting system by an estimated seventy percent (70%). The Contract will also create an estimated yearly cost savings to the City of One Hundred Fifty-Four Thousand Thirty-Eight Dollars (\$154,038) and an overall cost savings to the City of between Three Million Dollars (\$3,000,000) and Four Million Dollars (\$4,000,000).

**FISCAL IMPACT:** The fiscal impact of this Ordinance is a contract for the period of twenty years from July 1, 2019 through June 30, 2039, at an estimated total price of Two Million, Two Hundred Ninety-Four Thousand, Eight Hundred Eighty-Three Dollars (\$2,294,883). If the City is able to obtain an Efficient Energy Investment Fund Grant from DNREC, the estimated net cost of the Contract would be reduced to Two Million, One Hundred Twenty-One Thousand, Six Hundred Eighty-Three Dollars (\$2,121,683).

W0109106

# **EXHIBIT A**



# ENERGY SERVICES AGREEMENT

between

*City of Wilmington*

and

*Seiberlich Trane Energy Services*

Dated as of MONTH DATE, YEAR

Draft Agreement No. 1

CITY OF WILMINGTON LED STREET LIGHTING  
TABLE OF CONTENTS

## Table of Contents

<b>TABLE OF CONTENTS .....</b>	<b>2</b>
<b>TERMS AND CONDITIONS.....</b>	<b>3</b>
<b>SCHEDULE A – SCOPE OF WORK .....</b>	<b>9</b>
<b>SCHEDULE B – DESCRIPTION OF PREMISES.....</b>	<b>11</b>
<b>SCHEDULE C – ENERGY, RATE, AND STIPULATED OPERATIONAL SAVINGS.....</b>	<b>12</b>
<b>SCHEDULE D – SAVINGS VALIDATION PLAN FEE .....</b>	<b>17</b>
<b>SCHEDULE E – BASELINE ENERGY CONSUMPTION .....</b>	<b>18</b>
<b>SCHEDULE F – SAVINGS VALIDATION PLAN .....</b>	<b>19</b>
<b>SCHEDULE G – PROJECT SCHEDULE.....</b>	<b>20</b>
<b>SCHEDULE H – SYSTEMS STARTUP &amp; COMMISSIONING .....</b>	<b>21</b>
<b>SCHEDULE I – STANDARDS OF COMFORT .....</b>	<b>22</b>
<b>SCHEDULE K – OWNER’S MAINTENANCE RESPONSIBILITIES .....</b>	<b>23</b>
<b>SCHEDULE L – OPERATION AND MAINTENANCE MANUALS.....</b>	<b>24</b>
<b>SCHEDULE M – ESCO’S TRAINING RESPONSIBILITIES .....</b>	<b>25</b>
<b>SCHEDULE N – MILESTONE SCHEDULE.....</b>	<b>26</b>

CITY OF WILMINGTON LED STREET LIGHTING  
TABLE OF CONTENTS

## Terms and Conditions

**This Energy Services Agreement** (hereinafter the "Agreement") is made and entered into this \_\_\_ day of \_\_\_\_\_ in the year 20\_\_\_ by and between Seiberlich Trane Energy Services, a division of John R. Seiberlich Inc., (hereinafter "ESCO") and City of Wilmington (hereinafter "Owner") for the purpose of furnishing services designed to reduce energy consumption and operational costs at the premises and to furnish specified savings validation.

*Recitals:*

- A. Owner has entered into an Agreement with ESCO dated **MONTH DATE YEAR** (the "Master Agreement") the terms of which are incorporated herein by reference and applicable to ESCO with respect to work within the City of Wilmington, Delaware (the "Property").
- B. Owner wishes to engage ESCO to perform the services hereinafter described, and ESCO wishes to provide services with respect to the Property in accordance with the terms hereof.

*Schedules and Exhibits:*

**This Agreement** consists of Schedules A through N, which are attached hereto and incorporated herein by this reference:

Schedule A:	Scope of Construction Work
Schedule B:	Description of Facility
Schedule C:	Energy, Rate and Stipulated Operational Savings
Schedule D:	Savings Validation Plan Fee
Schedule E:	Baseline Energy Consumption
Schedule F:	Savings Validation Plan
Schedule G:	Construction and Installation Schedule
Schedule H:	Systems Start-Up and Commissioning
Schedule I:	Standards of Comfort
Schedule J:	Schedule of Rental Payments – <b>Intentionally Omitted</b>
Schedule K:	Agency Maintenance Responsibilities
Schedule L:	Operation and Maintenance Manuals
Schedule M:	ESCO's Training Responsibilities
Schedule N:	Milestone Schedule

**Now therefore**, with the intent to be legally bound hereby and for good and valuable consideration, the receipt of sufficiency of which is hereby acknowledged, the Owner and ESCO agree as follows:

1. ESCO shall provide the services and/or materials as set forth in Schedule A (the "Scope of Construction Work") in exchange for the consideration set forth in Schedule N (the "Milestone Schedule").

CITY OF WILMINGTON LED STREET LIGHTING  
TABLE OF CONTENTS

2. ESCO's work shall be completed in a satisfactory and thorough manner in accordance with Schedule A.

3. ESCO shall be solely responsible for providing all reasonable and necessary tools, machines, and equipment to complete the work as set forth in this Agreement and subsequent Schedules, including but not limited to, necessary materials, licenses, labor, power, light transportation, and safety equipment. The Scope of Construction Work shall be performed in accordance with all applicable laws, regulations and codes that govern the work under this Agreement.

Coverage B)

\$1,000,000 Each Accident  
\$1,000,000 Each Employee For Injury By Disease  
\$1,000,000 Aggregate For Injury By Disease

Owner shall be named as an additional insured on these policies on a primary and non-contributory basis. If requested by the Owner, the ESCO agrees to furnish acceptable performance and labor and material payment bonds.

4. ESCO shall submit to the Owner written requisitions for payment on AIA Document G702 and G703 showing the value of the work performed to date, from which an amount of 10% shall be deducted for retainage. Upon approval from the Owner, payment will be made to the ESCO within thirty (30) days of invoice date. Retainage invoicing will be accepted thirty (30) days after the Construction Unit has been commissioned, tested, and accepted by both Owner and ESCO.

6. ESCO agrees to save harmless the Owner and fully indemnify the Owner from any liability or suit for bodily Injury (Including death) or property damage arising from any act, omission, or negligence of the ESCO, including all costs attached to same. The ESCO further agrees to the extent it has been paid, to hold the Owner harmless from any and all liens and all claims of persons furnishing materials and/or labor in connection with this Agreement.

5. ESCO shall keep in force insurance of the following type and minimum coverage during the term of this Agreement:

Commercial General Liability

\$2,000,000 Products/Completed Operations Aggregate  
\$2,000,000 General Aggregate  
\$1,000,000 Any One Occurrence (Coverage A)  
\$1,000,000 Any One Person or Organization (Coverage B)

7. No extra work or changes under this Agreement will be recognized or paid unless agreed to in writing before the Scope of Construction Work is done or the changes made, in which case the changes shall be specified in detail, including the extra work or changes to be made, together with the price to be paid or the amount to be deducted, as the case may be. It is specifically agreed that no changes will be permitted from the Agreement without the written consent of the Owner.

Umbrella Liability

\$5,000,000 Products/Completed Operations Aggregate  
\$5,000,000 General Aggregate  
\$5,000,000 Any One Occurrence (Coverage A)  
\$5,000,000 Any One Person or Organization (Coverage B)

8. All payments made to ESCO by Owner under this Agreement shall constitute a trust fund in the hands of ESCO for the benefit of all persons, firms or corporations having performed work or labor, supplied services, or supplied materials for ESCO in connection with its obligation under this Agreement, and no such payment or any part thereof shall be diverted to or used by ESCO for any other purpose until all such claims have been fully paid.

Automobile Liability (Comprehensive Coverage)

\$1,000,000 Combined Single Limit

Employer's Liability (Worker's Compensation

In the event that ESCO shall fail to pay promptly



CITY OF WILMINGTON LED STREET LIGHTING  
TABLE OF CONTENTS

any amounts due any of its subcontractors, material men, employees, or others, or in event of the existence of any claim against ESCO or any of its subcontractors which has given or could give rise to a lien against the Property or against money or monies or any part thereof due the ESCO from Owner, Owner may pay the same and ESCO shall thereafter forthwith pay to Owner the amount so paid by Owner, or Owner may at its option retain, out of any monies then due or thereafter to become due to ESCO, an amount sufficient, in the opinion of Owner, to satisfy the said claim or lien, and if the amount payable to ESCO shall be insufficient to satisfy the said claim or lien then ESCO shall pay the deficiency to Owner.

9. Should the ESCO at any time refuse or neglect to supply sufficient workmen, or materials or proper quality or sufficient quantity, or become insolvent (either in the equity sense or the bankruptcy sense), make any assignment for the benefit of creditors, file or have filed against him any federal or state bankruptcy or receivership action, have any attachment or levy against or upon the person or property of the ESCO or upon funds due or to become due the ESCO from the Owner, or refuse to follow the Agreement, or otherwise be in breach of this Agreement, the Owner shall have the right, after fifteen (15) days written notice to the ESCO, or to anyone representing the ESCO in the performance of the Scope of Construction Work, to terminate this Agreement in whole or in part. In the event of a termination, the Owner may use any materials of ESCO as remain on the job or the Owner may direct the ESCO to remove said materials promptly, in which event, the Owner may elect to provide necessary materials, labor, etc. to complete the Agreement in whole or part and charge the cost thereof to the ESCO, crediting or debiting its account as the case may be when the Scope of Construction Work under this Agreement is fully completed and accepted. The ESCO expressly agrees to accept and to abide by the above clause in this connection, but nothing herein shall affect the right of Owner to recover damages from the ESCO for delay, mal-performance, or non-performance of this Agreement.

ESCO, when requested by Owner, shall supply a complete list of all suppliers, who are furnishing materials, and persons performing or furnishing labor to ESCO, as the work progresses. In the event the ESCO fails or refuses to supply a complete list of all suppliers and persons performing or furnishing labor and/or fails or refuses to submit to the Owner evidence of payment to such suppliers and persons performing or furnishing labor to ESCO, Owner shall have the option to withhold all monies otherwise due the ESCO until the information and documentation requested by the Owner is furnished by the ESCO.

10. On a daily basis, ESCO shall clean and remove from the jobsite and premises any debris caused by the performance of the Scope of Construction Work and unless otherwise expressly provided herein, upon completion of the Scope of Construction Work, shall clean, wash, remove protective coatings, etc., and shall leave the Property in a clean and acceptable condition. Should ESCO fail to perform such clean-up or fail to accomplish any corrective work required by Owner to ESCO's work to the satisfaction of the Owner, Owner shall provide such clean-up services and such corrective work on behalf of ESCO and ESCO agrees to reimburse Owner for such costs incurred.
11. Neither this Agreement nor the payments to become due thereunder shall be assignable without the consent of Owner and any assignment without such consent in writing shall vest no rights in the assignee against Owner.
12. ESCO guarantees its Scope of Construction Work against all defects in materials and workmanship as required by the Plans and Specifications; or, if no guarantee is specified, then for a period of one (1) year from the date of completion of ESCO's Scope of Construction Work and acceptance thereof by Owner.
13. This agreement constitutes the entire agreement between the Owner and ESCO; any and all prior agreements or understandings are superseded by this Agreement.

**The Total Contract Price** for the Scope of Construction Work performed under this Agreement, as defined in Schedule N attached hereto, and as generally described below but subject to the specific descriptions and conditions referenced in paragraphs A., B., 1. & 2. of this Agreement:

1. Furnish all material and labor necessary to perform the Scope of Construction Work as defined in Schedule A attached hereto.
2. Owner may elect to issue badges to ESCO personnel.
3. Normal work hours are Monday through Friday 7:00 AM to 4:00 PM.
4. Scope of Construction Work will follow the Owner's annual Holiday schedule for normal work days.
5. ESCO is required to hold regular project meetings. Date and time of meetings will be agreed upon by both Owner and ESCO.
6. Schedule: Time is of the essence for the Scope of Construction Work. Time for completion shall be in accordance with the requirements of this Agreement. ESCO shall be responsible for any acceleration or deceleration, unless responsibility for such acceleration or deceleration is specifically assumed in writing by Owner.
7. ESCO shall protect his work from hazards and shall be responsible for condition of the work until acceptance by Owner.
8. A Job Specific Certificate of Insurance for the ESCO, copy of the ESCO's DE Business, NCC Contractor, and City of Wilmington licenses, as well as, any other applicable license or permit must be received by the ESCO prior to the ESCO's acceptance of any contract billing.
9. Monthly ESCO invoices are due to Owner on or before the 15<sup>th</sup> of each month.
10. All ESCO deliveries including dumpsters and onsite material storage will be coordinated and approved by Owner and ESCO.
11. All inspections will be scheduled by the ESCO and coordinated through the Owner.
12. Owner will work in good faith to ensure access to work areas is not impeded for the ESCO. If the ESCO is delayed at any time in the progress of work due to the Owner, acts of God, or other causes, changes in cost and/or schedule time may be allowed as deemed reasonable by the Owner.

**CITY OF WILMINGTON LED STREET LIGHTING  
TABLE OF CONTENTS**

**IN WITNESS WHEREOF**, Owner and ESCO by and through their duly authorized representatives have set their hand and seal as of the day and year first above written.

**Owner**

City of Wilmington

By: \_\_\_\_\_ (SEAL)

Its: \_\_\_\_\_

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

**ESCO**

Seiberlich Trane Energy Services

By: \_\_\_\_\_ (SEAL)

Its: \_\_\_\_\_

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



CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE A  
SCOPE OF WORK

## Schedule A – Scope of Work

The scope of work for this project is to retrofit all the city-owned street lights for the City of Wilmington’s Department of Public Works.

The breakdown of the fixture types are as follows:

TYPE	QUANTITY
ARLINGTON	3
COBRA	41
GRANVILLE	848
GRANVILLE_DBL	496
SHOEBOX	37
SHOEBOX_DBL	22
TEAR_DROP	196
TEAR_DROP_DBL	66
TURN_OF_CENTURY	21
WALL PACK	2
<b>GRAND TOTAL</b>	<b>1732</b>

Retrofit or replace all 1,732 fixtures with LED lamps or fixtures. Lighting illumination levels will be based on ANSI/IES RP-8-14 light level standards for roadway lights. Optimum illumination levels will be achieved within reasonable limitations of the existing light pole locations, heights, interferences, and spacing.

- Most of the existing lamps are 150W HPS lamps in decorative pole topper fixtures. For those fixtures, we would be retrofitting the lamp with a 57W LED lamp with an integral 7-pin control receptacle.
- All of the cobra head, wall pack and shoebox fixtures would be replaced in their entirety with an LED fixture selected to meet or exceed existing light levels. All LED fixtures would have an integral 7-pin control receptacle.

### Product Selection

- All new lamps/fixtures to be provided with a 10-year parts warranty from the manufacturer
- New lights are DLC-qualified products rated at (minimum) 100,000 hours L70.
- Lighting color options are 3000k, 4000k or 5000k (final color selection to be determined in cooperation with the City).
  - 4000k has been tentatively selected by the project team and is recommended by STES engineering team.

## Lighting Controls

This enables centralized features such as scheduling, sub-meters, maintenance notifications, surge protection, trimming/dimming control, and other 'smart city' capabilities from a networked user interface.

- All fixtures would include a 7-pin control receptacle for controls options.
- All fixtures would be provided with a photocontrol for on/off control based upon ambient light levels.
- All fixtures would be provided with a control node for each fixture allowing for on/off control, lighting status and dimming control.

## Installation Plan

- Installation assumes a continuous normal 8-hour work day between 7:00 AM – 5:00 PM. Seiberlich Trane will work with the City to adjust schedules if a shorter time window is needed to accommodate traffic.
- Traffic control includes cones and signage at the bucket truck. It is assumed flaggers, road closures, and other traffic control is not needed, and costs for these traffic control measures are not included in this proposal. If additional traffic control measures are needed, Seiberlich Trane will work with the City to achieve whatever traffic measures the City requires or desires.
- Installation electricians are trained and qualified to work in primary/secondary voltage zones.

## Testing Plan

Electrical consumption measurements (Watts, Amps, Volts) will be taken on a statistically-significant sample of each type of retrofit lighting. Measurements include before and after retrofitting to verify that actual electrical savings match or exceed anticipated/calculated savings. A report will be provided detailing all such measurements and comparing them to the anticipated/calculated savings.

## Warranties

- All workmanship is warranted by a full 1-year parts and labor warranty by STES

## Exclusions

- Modification, removal or replacement of existing lighting poles or light arms (on power poles).
- Supply or installation of additional light poles.
- Supply or installation of decorative pole-topper light enclosures.
- Repair or replacement of electrical cabling or equipment supplying the existing lamp.

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE B  
DESCRIPTION OF PREMISES

## Schedule B – Description of Premises

As requested by the Department of Public Works, we looked at replacement of all of the City owned lights in Wilmington. In total, from data gathered from the GIS system and an extensive field audit, we identified 1,732 total fixtures for retrofit or replacement. The breakdown of the fixture types are as follows:

ARLINGTON	3
COBRA	41
GRANVILLE	848
GRANVILLE_DBL	496
SHOEBOX	37
SHOEBOX_DBL	22
TEAR_DROP	196
TEAR_DROP_DBL	66
TURN_OF_CENTURY	21
WALL PACK	2
(blank)	
<b>Grand Total</b>	<b>1732</b>

All 1732 City-owned fixtures were plotted on a map view, shown below:

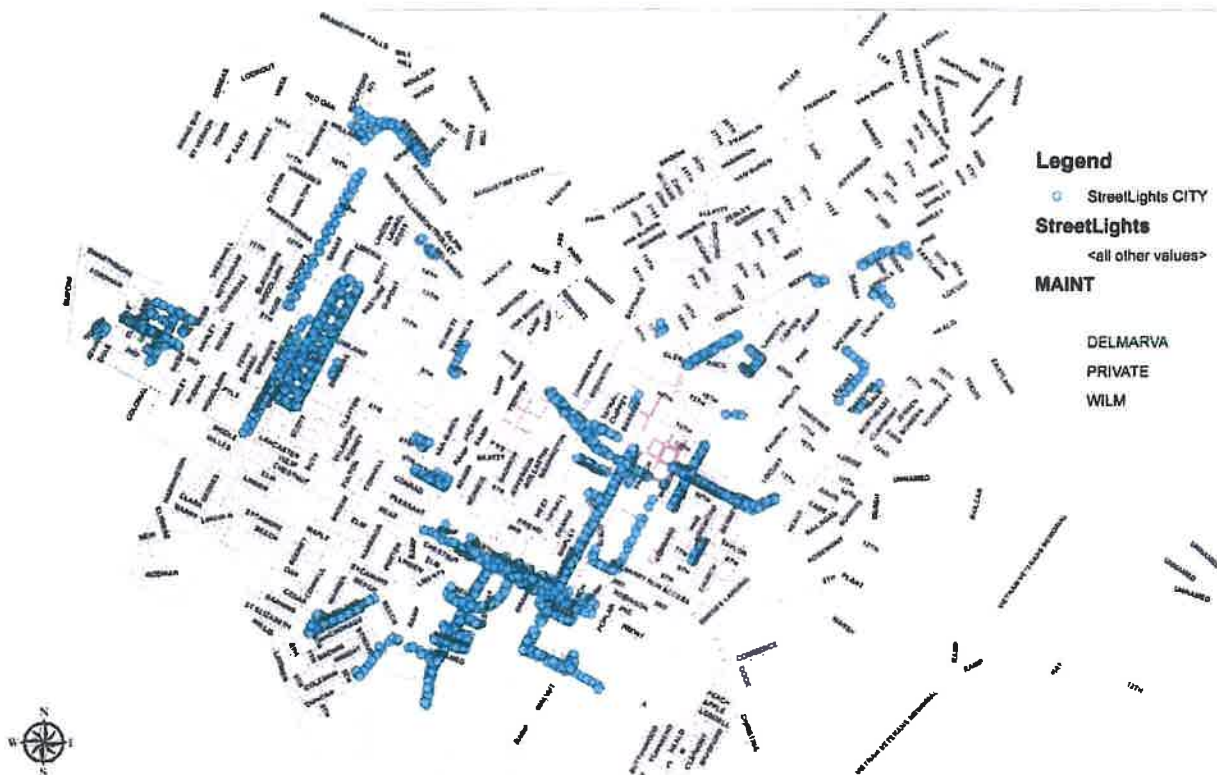


Figure 1 - Map view of city-owned lighting fixtures



CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE C  
ENERGY, RATE AND STIPULATED OPERATIONAL SAVINGS

## Schedule C – Energy, Rate, and Stipulated Operational Savings

### Energy Savings

STES engineers calculated the electricity savings for this project to be 999,730 kWh per year (compared to the current electricity usage from the 1,732 existing fixtures as 1,445,426 kWh/year). The savings projected are 70% versus the existing energy usage!

### Rate Savings

In this section, we will show how we calculated the project’s anticipated cost savings. Because these lights are all unmetered street lights on a utility tariff with Delmarva Power, the energy savings and rate savings are decoupled and not necessarily correlated. To determine the applicable tariff rates being paid currently and after the project, the following information sources were confirmed:

1. Delmarva Power Published Utility Tariff (provided in Appendix)
2. Most Recent Utility Bill for City of Wilmington (provided in Appendix)

Using those information sources, our engineers matched up the inventory of street lights audited and included in this scope of work to the tariff structure and the utility bill.

Based on this analysis, the following summary spreadsheet was developed to show total expected savings based on the current published tariff.

City of Wilmington - LED Streetlight Retrofit - Savings Analysis (Current Tariff Structure)										
			Existing				LED Retrofit			
Lamp size	Service Category	Quantity	Monthly Use	Total Use	Tariff Rate	Monthly Cost	LED Monthly Use	LED Total Use	Tariff Rate	Monthly Cost
4200L 100W	E	16	46	736	\$7.21	\$115.36	19	304	\$2.62	\$41.92
5800L 70W	A	43	36	1548	\$9.07	\$390.01	15	645	\$2.62	\$112.66
5800L 70W	E	17	36	612	\$1.28	\$21.76	15	255	\$2.62	\$44.54
9500L 100W	E	4	49	196	\$8.08	\$32.32	19	76	\$2.62	\$10.48
9500L 100W	A	560	49	27440	\$9.57	\$5,359.20	19	10640	\$2.62	\$1,467.20
9500L 100W	E	9	49	441	\$6.44	\$57.96	19	171	\$2.62	\$23.98
9500L 100W	D	479	49	23471	\$2.55	\$1,221.45	19	9101	\$2.62	\$1,254.98
16000L 150W	A	54	69	3726	\$10.60	\$572.40	30	1620	\$2.62	\$141.48
16000L 150W	A	523	69	36087	\$2.55	\$1,333.65	30	15690	\$2.62	\$1,370.26
50000L 400W	E	5	164	820	\$6.00	\$30.00	76	380	\$2.62	\$13.10
34000L 400W	A	16	155	2480	\$18.33	\$293.28	76	1216	\$2.62	\$41.92
34000L 400W	A	2	155	310	\$5.70	\$11.40	76	152	\$2.62	\$5.24
TRAD HP SODIUM		15			\$4.10	\$61.50			\$4.10	\$61.50
TRN CNT L-STL A		340			\$21.33	\$7,252.20			\$21.33	\$7,252.20
CON HPSD SHOEBX		19			\$4.10	\$77.90			\$4.10	\$77.90
HP SOD FL LGT		4			\$4.10	\$16.40			\$4.10	\$16.40
25-40'WOOD POLE		13			\$7.60	\$98.80			\$7.60	\$98.80
1-24'FBRGL PL		12			\$7.35	\$88.20			\$7.35	\$88.20
25-40'FBRGL PL		16			\$13.09	\$209.44			\$13.09	\$209.44
25-40'ALPL NBRK		1			\$19.63	\$19.63			\$19.63	\$19.63
25-40'METAL PL		4			\$7.34	\$29.36			\$7.34	\$29.36
			97,867			\$17,292.22	40,250			\$12,380.79

Figure 2 - LED Street Light Tariff Savings Projected (Current Tariff)

Note that for each fixture, there is a cost paid monthly for the utility tariff (column F in the table above) and a separate, additional cost paid to a 3<sup>rd</sup> party supply company for the supply charges (not shown in



CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE C  
ENERGY, RATE AND STIPULATED OPERATIONAL SAVINGS

the above table). Also note that since these fixtures are unmetered, the supply charges are not based on actual consumption or even rated energy usage of the fixture, rather they are based on the published utility tariff, which projects a monthly consumption value for all fixtures within a given class. These values are shown in the “Monthly Use” and “LED Monthly Use” columns in the table above, and also found in the published Delmarva Utility Tariff.

Based on this cost structure, which was verified in the utility bills provided by the Owner, the following summary table shows the total expected savings based on the current published tariff and supply contracts.

<b>Existing Monthly kWh (per tariff)</b>	<b>97,867</b>
<b>Monthly Supply Charges</b>	<b>\$3,409.80</b>
<b>Energy Cost (\$/kWh)</b>	<b>\$0.0348</b>
<b>LED Monthly Kwh (per tariff)</b>	<b>40,250</b>
<b>Estimated Supply Charges</b>	<b>\$1,402.36</b>
<b>Monthly Tariff Savings (Lights &amp; Poles)</b>	<b>\$4,911.43</b>
<b>Monthly Electric Supply Savings (est)</b>	<b>\$2,007.44</b>
<b>Total Monthly Utility Cost Savings</b>	<b>\$6,918.87</b>
<b>Total Annual Utility Cost Savings</b>	<b>\$83,026.48</b>
<b>\$/Fixture/Year O&amp;M Savings</b>	<b>\$41.00</b>
<b>Total Annual O&amp;M Cost Savings</b>	<b>\$71,012.00</b>
<b>Total Annual Savings</b>	<b>\$154,038.48</b>

*Figure 3 - Total Annual Savings Based on Current Utility Tariff Structure*

Note that if, as widely expected, Delmarva updates their LED tariff rates to be more consistent with all their other unmetered street lighting rates, both the tariff savings and 3<sup>rd</sup> party supply savings will increase, as the “LED Monthly Use” value published is considerably higher than the lights are expected to use once installed, meaning the Owner will be overcharged and not reap the full benefits of the project until that time. To help aid the effort of appealing to Delmarva and the Public Service Commission, which oversees the utility rate cases in Delaware, these lights are being installed with integral metering and so hard data can be provided to prove the over-estimation of “LED Monthly Use”.

To further aid this effort, the Delaware Sustainable Energy Utility hired a utility rate consultant, Gabel Associates, to review the unmetered street light tariffs in Delaware specifically for LED street lights. In their report “LED Tariff Analysis\_UPDATE Study\_DSEU\_FINAL\_04-16-2018” (see Appendix), they recommended in their findings what the LED rates should be. STES plugged those recommended rates into the same chart above and the savings improved significantly:

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE C  
ENERGY, RATE AND STIPULATED OPERATIONAL SAVINGS

<b>City of Wilmington - LED Streetlight Retrofit - Savings Analysis (Anticipated Tariff Structure)</b>										
Lamp size	Service Category	Quantity	Existing				LED Retrofit			
			Monthly Use	Total Use	Tariff Rate	Monthly Cost	LED Monthly Use	LED Total Use	Tariff Rate	Monthly Cost
4200L 100W	E	16	46	736	\$7.21	\$115.36	19	304	\$0.65	\$10.40
5800L 70W	A	43	36	1548	\$9.07	\$390.01	15	645	\$0.65	\$27.95
5800L 70W	E	17	36	612	\$1.28	\$21.76	15	255	\$0.65	\$11.05
9500L 100W	E	4	49	196	\$8.08	\$32.32	19	76	\$0.65	\$2.60
9500L 100W	A	560	49	27440	\$9.57	\$5,359.20	19	10640	\$0.65	\$364.00
9500L 100W	E	9	49	441	\$6.44	\$57.96	19	171	\$0.65	\$5.85
9500L 100W	D	479	49	23471	\$2.55	\$1,221.45	19	9101	\$0.65	\$311.95
16000L 150W	A	54	69	3726	\$10.60	\$572.40	30	1620	\$0.65	\$35.10
16000L 150W	A	523	69	36087	\$2.55	\$1,333.65	30	15690	\$0.65	\$339.95
50000L 400W	E	5	164	820	\$6.00	\$30.00	76	380	\$0.65	\$3.25
34000L 400W	A	16	155	2480	\$18.33	\$293.28	76	1216	\$0.65	\$10.40
34000L 400W	A	2	155	310	\$5.70	\$11.40	76	152	\$0.65	\$1.30
TRAD HP SODIUM		15			\$4.10	\$61.50			\$4.10	\$61.50
TRN CNT L-STL A		340			\$21.33	\$7,252.20			\$21.33	\$7,252.20
CON HPSD SHOEBX		19			\$4.10	\$77.90			\$4.10	\$77.90
HP SOD FL LGT		4			\$4.10	\$16.40			\$4.10	\$16.40
25-40'WOOD POLE		13			\$7.60	\$98.80			\$7.60	\$98.80
1-24'FBRGL PL		12			\$7.35	\$88.20			\$7.35	\$88.20
25-40'FBRGL PL		16			\$13.09	\$209.44			\$13.09	\$209.44
25-40'ALPL NBRK		1			\$19.63	\$19.63			\$19.63	\$19.63
25-40'METAL PL		4			\$7.34	\$29.36			\$7.34	\$29.36
			<b>97,867</b>			<b>\$17,292.22</b>		<b>40,250</b>		<b>\$8,976.63</b>

Figure 4 - LED Street Light Tariff Savings Projected (Anticipated Tariff)

Existing Monthly kWh (per tariff)	97,867
Monthly Supply Charges	\$3,409.80
Energy Cost (\$/kWh)	\$0.0348
LED Monthly kWh (per tariff)	40,250
Estimated Supply Charges	\$1,402.36
Monthly Tariff Savings (Lights & Poles)	\$8,315.59
Monthly Electric Supply Savings (est)	\$2,007.44
<b>Total Monthly Utility Cost Savings</b>	<b>\$10,323.03</b>
<b>Total Annual Utility Cost Savings</b>	<b>\$123,876.40</b>
\$/Fixture/Year O&M Savings	\$41.00
<b>Total Annual O&amp;M Cost Savings</b>	<b>\$71,012.00</b>
<b>Total Annual Savings</b>	<b>\$194,888.40</b>

Figure 5 - Total Annual Savings Based on Anticipated Utility Tariff Structure

### Stipulated Operational Savings

LED conversions vastly reduce streetlight maintenance costs. LEDs last twenty years (or more), whereas their legacy counterparts require bulb replacements every two to five years.

Lifetime O&M savings is calculated based on the knowledge that if not for this project, the Owner would have continued their current practice of replacing lamps and ballasts and fixtures as they failed.

Annual Maintenance Savings was calculated by assuming a 4-year cycle of existing fixture spot relamping, cleaning, changing igniters, ballasts, photocells, etc. vs. LED 10-year cleaning cycle and occasional photocell and driver replacements). Our engineers arrived at a value of \$41 per-fixture-per-year for Annual Maintenance Savings.

**CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE C  
ENERGY, RATE AND STIPULATED OPERATIONAL SAVINGS**

According to the United States Department of Energy, useful life (or rated life) is “often described by the number of operating hours until the LED luminaire is emitting **70 percent** of its initial light output.” It is through this definition that we find the L70 rating.

The tested L70 rating on the fixtures proposed in this project were 293,000 hours according to factory test data provided to us. Assuming an annual run time of 4,100 hours, which is commonly accepted for outdoor street lights, this equates to 71 years before the lights would run at 70% of their rated output!!! It would be unwise to accept a 71 year life cycle for any product, but its clear that assuming a 20 year useful life for these fixtures is a very realistic assumption, and is what we used in our O&M savings calculations. Such test results are not uncommon today, as LED fixture product development continues to produce fixtures with amazing efficiencies and life cycle test data.

**TM-21 Inputs**

**Instructions**

Yellow fields are completed by the user. Fields not used should be left blank. Cyan fields are calculated based on user entries.

First, enter a description of the LED light source tested. Then complete the fields labeled "LM-80 Testing Details". Test duration must be at least 6,000 hours. If only one case temperature data set is to be used (no interpolation), complete only "Tested case (temperature 1)". For only two case temperature data sets, complete 1 and 2.

Next, further to the right, in the corresponding box(es) for each tested case temperature, enter the test data along with the time (in hours) at which each measurement was taken. Data entered must be normalized then averaged measured data (per TM-21 sections 5.2.1 and 5.2.2).

Enter drive current, in-situ temperature data and the percentage of initial lumens to project in the fields labeled "In-Situ Inputs".

Results can be tailored to estimate lumen maintenance at a specific time by entering a value (t) in the yellow field.

A complete TM-21 report will appear on the next tab labeled "Report".

Description of LED Light Source Tested (manufacturer, model, LM80 rating)		LM-80 Test Inputs					
CLG-120W		Test Data for 80°C Case Temperature		Test Data for 105°C Case Temperature		Tested Case Temperature 3	
Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)	Time (hours)	Lumen Maintenance (%)
0	100.00%	0	100.00%				
1000	98.82%	1000	97.70%				
2000	96.72%	2000	97.50%				
3000	96.50%	3000	97.30%				
4000	96.01%	4000	96.90%				
5000	96.38%	5000	97.20%				
6000	96.41%	6000	97.30%				
7000	96.16%	7000	96.80%				
8000	97.80%	8000	96.40%				
9000	97.60%	9000	96.40%				

LM-80 Testing Details	
Total number of units tested per case temperature	10
Number of failures	0
Number of units measured	10
Test duration (hours)	9000
Tested drive current (mA)	3880
Tested case temperature 1 (T <sub>c</sub> , °C)	85
Tested case temperature 2 (T <sub>c</sub> , °C)	105
Tested case temperature 3 (T <sub>c</sub> , °C)	

In-Situ Inputs	
Drive current for each LED package/array/module (mA)	360
In-situ case temperature (T <sub>c</sub> , °C)	40
Percentage of initial lumens to project to (e.g. for L <sub>70</sub> , enter 70)	70

Results	
Time (t) at which to estimate lumen maintenance (hours)	292,500
Lumen maintenance at time (t) (%)	96.500
Calculated L70 (hours)	293,000
Reported L70 (hours)	293,000

As of note, DEMEC in 2016 did a small LED retrofit project for five Delaware municipalities and in their M&V savings report, they used a similar \$40 per-fixture-per-year amount of projected O&M savings based primarily on the significant reduction in replacement/repair frequency required, which for outdoor street lights can be significant.

The \$41 per-fixture-per-year assumption also does not factor in any savings to the Owner of the wages or truck costs of the employees who drive around the city daily looking for outages. The lighting controls system being installed as part of this project will automatically report on outages and save considerable time and frustration. The economic value of this has not yet been calculated since the more tangible energy, tariff, and O&M savings already cover the annual debt service for the project.

**CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE C  
ENERGY, RATE AND STIPULATED OPERATIONAL SAVINGS**

**Evaluation of Additional Societal Benefits**

Additional benefits associated with the LED lighting project include greenhouse gas avoidance. A greenhouse gas (GHG) is any gas in the atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Human activities since the beginning of the Industrial Revolution (taken as the year 1750) have produced a 40% increase in the atmospheric concentration of carbon dioxide, from 280 ppm in 1750 to 406 ppm in early 2017.

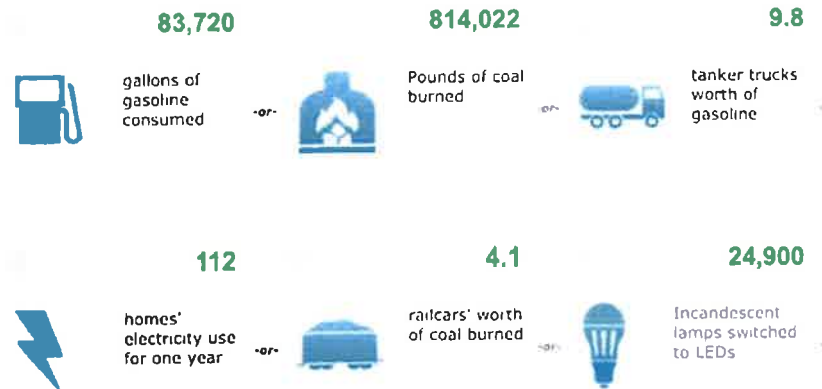
The calculated annual CO<sub>2</sub> emissions avoided as a result of this project are measured at 705.36 metric tons. This is calculated by converting the reductions of electrical reductions (kWh) into avoided units of CO<sub>2</sub> by using the EPA greenhouse gas equivalency calculator. Similarly, the sum of the greenhouse gas emissions saved can also be reviewed as a Carbon Dioxide Equivalent (CO<sub>2</sub>e) of the following GHG emissions:

- 159 passenger vehicles driven for one year or 1,823,569 miles driven, or
- 112 homes' electricity use for one year, or
- 259 tons recycled instead of landfilled.

**Greenhouse gas emissions from**



**CO<sub>2</sub> emissions from**



*Figure 6 - US EPA Website Carbon Equivalency Calculator*

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE D  
SAVINGS VALIDATION PLAN FEE

## Schedule D – Savings Validation Plan Fee

In general, determining actual savings achieved can be difficult and costly. Verifying savings requires confirming that:

- The baseline conditions were accurately defined
- The proper equipment/systems were installed and properly commissioned
- The equipment/systems are performing to specification

Although confirming these items may appear simple, a structured approach is helpful. The Savings Validation Plan Scope of Services is set forth in Schedule F.

The following represents the annual payments to be made to ESCO for the Savings Validation Plan Services to be provided in accordance with the scope of services set forth in Schedule F.

<b>Annual Savings Validation Plan Fee Payments</b>		
<b>Due</b>	<b>Tag</b>	<b>Amount</b>
Years 1 through 20	Savings Validation Plan Services	\$ TBD / year
	<b>Total</b>	<i>Pending</i>

Annual Monitoring and Reporting Payments are NOT included in the total project price laid out in Schedule N. They are paid for separately on an annual basis by Owner to ESCO.

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE E  
BASELINE ENERGY CONSUMPTION

## Schedule E – Baseline Energy Consumption

STES engineers calculated the total energy consumption for the 1,732 existing fixtures as 1,445,426 kWh/year.

Based on the Street Lighting Tariff (see Appendix for more details) that the City of Wilmington pays for these lights, the following summarizes the monthly cost as \$17,292.22 for these 1,732 fixtures. This equates to an existing utilities expense of \$207,506.64 per year. ***This excludes the considerable operations and maintenance costs to the City's Department of Public Works for maintaining and servicing the equipment.***

Lamp size	Service Category	Quantity	Existing			
			Monthly Use	Total Use	Tariff Rate	Monthly Cost
4200L 100W	E	16	46	736	\$7.21	\$115.36
5800L 70W	A	43	36	1548	\$9.07	\$390.01
5800L 70W	E	17	36	612	\$1.28	\$21.76
9500L 100W	E	4	49	196	\$8.08	\$32.32
9500L 100W	A	560	49	27440	\$9.57	\$5,359.20
9500L 100W	E	9	49	441	\$6.44	\$57.96
9500L 100W	D	479	49	23471	\$2.55	\$1,221.45
16000L 150W	A	54	69	3726	\$10.60	\$572.40
16000L 150W	A	523	69	36087	\$2.55	\$1,333.65
50000L 400W	E	5	164	820	\$6.00	\$30.00
34000L 400W	A	16	155	2480	\$18.33	\$293.28
34000L 400W	A	2	155	310	\$5.70	\$11.40
TRAD HP SODIUM		15			\$4.10	\$61.50
TRN CNT L-STL A		340			\$21.33	\$7,252.20
CON HPSD SHOEBX		19			\$4.10	\$77.90
HP SOD FL LGT		4			\$4.10	\$16.40
25-40' WOOD POLE		13			\$7.60	\$98.80
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25-40' ALPL NBRK		1			\$19.63	\$19.63
25-40' METAL PL		4			\$7.34	\$29.36
				97,867		\$17,292.22



CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE F  
SAVINGS VALIDATION PLAN

## Schedule F – Savings Validation Plan

### M&V Basic Information

- Guarantee term: 20 years
- Buildings/sites: Wilmington, DE

### Scheduling and Reporting for Measurement and Verification Activities

Measurement and Verification (M&V) will be performed by ESCO to ensure long-term recognition of expected utility usage savings. Below is a detailed description of what is included as a part of the M&V agreement.

### Utility Bill Collection

Each month Owner will collect the utility bills for the Property and will forward such bills to ESCO for utility usage reconciliation and reporting. Other simpler, more efficient or automated options for getting the utility bills to ESCO can be discussed and agreed upon by both parties.

### Annual Savings Statement

Within 90 days of the end of each “M&V reporting year”, ESCO will provide an Annual Savings Statement for the Guaranteed Savings under the Option A methodology described below.

The utility information in the Annual Savings Statement will be adjusted for Material Changes as defined in this Agreement. Material Changes are non-routine adjustments and include items such as new equipment installation, changes in usage or occupancy of the equipment, schedule changes, and other changes. ESCO may, at its option, be compensated for costs to reconcile the impact of Material Changes included in the Annual Savings Statement.

### Option A—Retrofit Isolation with Key Parameter Measurement

This option is based on a combination of measured and estimated factors when variations in factors are not expected. Measurements are spot or short-term and are taken at the component or system level, both in the baseline and post-installation cases. Measurements should include the key performance parameter(s) which define the energy use of the ECM. Estimated factors are supported by historical or manufacturer’s data. Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values. Adjustments to models are not typically required.

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE G  
PROJECT SCHEDULE

## Schedule G – Project Schedule

The project schedule begins upon execution by the ESCO and the Owner of the Agreement or a Notice to Proceed and is expected to take approximately 12 months.

Factors that will be considered for the final schedule include:

- Availability of the work areas, etc.
- Equipment production and delivery timelines

ESCO will deliver a detailed Microsoft Project work plan & schedule upon project kickoff, immediately following contract execution.

The project schedule will include regular biweekly project meetings with the Owner to provide project status updates and weekly construction team meetings to coordinate installation activities with all subcontractors and project personnel.



CITY OF WILMINGTON LED STREET LIGHTING  
 SCHEDULE H  
 SYSTEMS STARTUP & COMMISSIONING

## Schedule H – Systems Startup & Commissioning

At the conclusion of the construction phase for this project, ESCO will perform commissioning activities.

All documentation from this effort will be collected and organized into a report to be provided to the Owner. In addition, this information will be used as the foundation for the initial energy performance validation process.

ESCO will provide a full commissioning plan ahead of the commissioning phase of the project for review of the customer. Commissioning plan will specify parties to be involved, responsibilities of each party, specific task to be completed, etc.

Manufacturers’ installation and operations manuals will be used as the guiding reference documents, along with detailed startup checklists for the engineered equipment.

To ensure a smooth flow of operations and maintenance with newly installed equipment, documents supporting specific ECMs will be provided to Owner when the ECM is turned over. Among other relevant documents, this will include Operations and Maintenance manuals for new equipment. Additionally, an organized summary package of all turnover documents will be submitted to Owner when the overall project is complete.

Each ECM shall comprise a Construction Unit and the Construction Work will be completed for each ECM.

ECM	Commissioning Plan
Lighting Retrofit	<ul style="list-style-type: none"> <li>• Testing includes taking sample measurements of light levels, voltage and amperage immediately before demolition and again after burn-in of the newly installed lighting. This testing will be performed on 10% of all fixtures having greater than 50 fixtures of that type installed.</li> <li>• Final Inspection by Subcontractor, ESCO and Owner</li> <li>• Documented Owner Acceptance</li> </ul>

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE I  
STANDARDS OF COMFORT

## Schedule I – Standards of Comfort

The energy savings calculations in this project assumed a typical run time of 4,100 hours per year. With the use of lighting controls included in this project, the total run time should ultimately be lower due to the dimming control. It is assumed that at no time after the project will Owner decide to intentionally operate all the lights 24/7 or during daylight hours where the total run time would significantly exceed 4,100 hours per year.

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE K  
OWNER'S MAINTENANCE RESPONSIBILITIES

## Schedule K – Owner's Maintenance Responsibilities

Owner acknowledges that it has an integral role in achieving savings and agrees to perform the following responsibilities:

- a. Properly maintain, repair, and replace all energy consuming equipment with equipment of equal or better energy and operational efficiencies and promptly notify ESCO of the repair and /or replacement, but no later than within thirty (30) calendar days from the commencement thereof;
- b. Make available to ESCO upon its request copies of maintenance records and procedures regarding maintenance of the Premises;
- c. Promptly provide ESCO with notice of system or equipment alterations at the Premises that impact energy consumption, including but not limited to: energy management systems, occupancy sensors, photocell/timer control of exterior lighting systems;
- d. Provide to ESCO true, accurate and complete copies of all energy related bills within fifteen (15) days after Owner's receipt of such bills. And;
- f. Furnish to ESCO true, accurate and complete copies of any utility rate schedules or tariffs promptly upon ESCO's request for the same and, in any event, within thirty (30) calendar days after Owner's receipt of notice of a utility rate change;
- g. During the Term of the Agreement, permit only ESCO and/or Owner approved personnel to repair, adjust or program equipment, systems, and/or controls covered by this Agreement or affecting equipment, systems, and/or controls covered by this Agreement, except in the event of an emergency, in which event Owner shall immediately notify ESCO of the existence of the emergency no later than within forty-eight (48) hours of the commencement of the emergency condition.

CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE L  
OPERATION AND MAINTENANCE MANUALS

## Schedule L – Operation and Maintenance Manuals

Certain maintenance and inspection activities will be required of Owner to ensure the building maintains its energy performance. Installation, operations and maintenance manuals will be delivered at the end of the project for the new equipment installed under this conservation project, including, but not limited to:

ECM #1: Lighting Retrofit
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**CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE M  
ESCO'S TRAINING RESPONSIBILITIES**

## **Schedule M – ESCO's Training Responsibilities**

A full training program is incorporated into this project. The training program includes the following:

1. Training for Department of Public Works staff on proper maintenance and operation of all new LED fixtures
2. Training on the software for lighting controls provided under the project

**CITY OF WILMINGTON LED STREET LIGHTING  
SCHEDULE N  
MILESTONE SCHEDULE**

## Schedule N – Milestone Schedule

The following table summarizes the cost breakdown for the project.

<b>TOTAL CONTRACT PRICE (<i>excluding sales tax</i>) .....</b>	<b>\$ 2,294,883.00</b>
<b>Anticipated DNREC EEIF Grant .....</b>	<b>\$ 173,200.00</b>
<b>TOTAL NET PROJECT COST (after DNREC EEIF Grant, <i>excluding sales tax</i>) .....</b>	<b>\$ 2,121,683.00</b>