

Attachment A:

ESCO Services & Technical Requirements

1.0 Attachment Overview and Purpose

The purpose of this document is to define the City requirements and deliverables for ESCO services associated with Project Development and Implementation. The document will define all the project phases and required services and deliverables per phase. This document will also define associated product and service solution specifications and submittal requirements. It is expected that all the requirements and specifications defined in this section will be represented in the final GESC (Attachment B) and the associated schedules.

The following terms and abbreviations will be used in this section:

- Request for Proposal (RFP) – *procurement approach utilized to evaluate and select an ESCO team to lead the development and implementation of a LED streetlighting conversion project*
- Energy Service Company (ESCO) – *Energy Service Company selected for this project*
- Manufacturer Partner (MP) – *ESCO selected team partner providing product luminaire and control solutions to the project*
- Distribution Partner (DP) – *ESCO selected team partner providing distribution services to the project*
- Installation Partner (IP) – *ESCO selected team partner providing installation services to the project*
- Lighting Management System (LMS) – *all hardware, software and services combined to create a comprehensive lighting management system*
- Lighting System Database (LSDB) – *a comprehensive data base developed through all phases of this project that reflects all the specifications associated with this project and the status of implementation*
- Network Lighting Controller (NLC) – *luminaire mounted “node” that communicates with the LMS*
- Network Management Server (NMS) – *server-based management system to increase LMS network reliability and security for some LMS options.*
- Central Management System (CMS) – *LMS operating system hosted in the cloud by the ESCO MP*
- Graphical User Interface (GUI) – *browser-based user interface to CMS accessed via a computer, tablet or smart phone*

- Distributor Net Cost (D/N Cost) – *product cost from manufacturer to the distributor without the distributor markup (defined separately)*

2.0 Overview of Project Development and Implementation Phases

The City expects the ESCO to lead the project development and implementation in a phased approach as defined here:

- **Phase 1: Project Development**
 - Project Kickoff
 - Existing Data Collection
 - Field Audit
 - Preliminary Design
 - Final Product Evaluation/Selection
 - Community Outreach/Trial Install
 - Final Design
- **Phase 2: Implementation**
 - Procurement/Pre-Construction
 - Construction & Project Management
 - Project Close-Out
 - PECO Bill Updates & Rebate Management
 - Project Documentation
- **Phase 3: Measurement & Verification (M&V)**
 - (3) Years of M&V Services & Reports

The above phasing is provided to clearly define the project development and implementation process.

3.0 ESCO Required Services and Deliverables by Phase

The following defines the ESCO services and deliverables for each phase of the project development and implementation process:

3.1 Phase 1: Project Development

- **3.1.1 Project Kickoff Meeting**

- ESCO to schedule and lead a **Project Kickoff Meeting** with the City and any key ESCO team members and partners to discuss all project phases, services to be provided, data requests and timeline.
- **3.1.2 Existing Data Collection**
 - ESCO to work with the City to identify/obtain all available existing relevant datasets, including, but not limited to, the following:
 - PECO Utility Bills (pdf)
 - PECO Address Files (MS Excel)
 - City Lighting System Asset Inventory (MS Excel)
 - Combined/Integrated HID and LED inventory datasets
 - City Lighting System GIS Data, if available
 - Manufacturer Product Data/Cut-Sheets for previously used and/or current standard luminaire types, photocells, poles, etc.
 - City and State Road Classifications
 - State road classifications (provided by ESCO) should be compared to City road classifications to develop final design road classifications.
 - Other City Datasets
 - High injury (street sections) network data: <https://www.opendataphilly.org/dataset/high-injury-network>
 - Crash point data: <https://www.opendataphilly.org/dataset/crash-points>
 - Crime incident point data: <https://www.opendataphilly.org/dataset/crime-incidents>
 - ESCO is responsible for taking all the above datasets and creating a plan for utilizing the information in the development of a comprehensive Lighting System Database (LSDB), defined in Attachment A.5 and discussed throughout this document. The ESCO will add information in the LSDB through all phases of this project. The LSDB will reflect all the specifications associated with this project and the status of implementation. The LSDB will be owned by the City and will be a compilation of many project inputs, including, but not limited to City existing inventory data, project field-audit data, LMS data, etc.
- **3.1.3 Field Audit**
 - ESCO to schedule and lead a **Pre-Audit Planning Meeting** with the City and any key ESCO team members and partners to discuss all aspects of the auditing process.
 - The ESCO and their Audit/GIS Partner will be responsible for all data collection, data scrubbing, and mapping tasks listed below.
 - Audit Prep
 - Utilize available existing City and/or PECO location data discussed above to geo-locate current luminaire location records for use during the investment grade field audit. It is likely that existing data may require a QC review and possibly modifications.
 - Develop a web-based **Project Webmap Portal** viewable via a web browser by the City to see existing luminaire locations and track the progress of the investment grade field audit. This webmap will continue to be used throughout the entirety of the project with new layers added during project development and implementation. A complete list of all required layers and attributes is provided in the Lighting System DB Attributes tab in the RFP Submittal Worksheet (Attachment A.1). The

following is a summarized list of GIS WebMap layers and attributes that will be required or developed:

- Base Street Layers
 - City Boundary Layer
 - PA Road Classification Layer
 - City Road Classification Layer
 - Final Design Road Classification Layer
 - Reconciled road classification using previous two road classification layers as option inputs
 - City High Injury Network Layer
 - City Crash Location Layer
 - City Crime Incident Layer
 - PECO Address File Layer
- Pre-Audit Layer
 - Multiple attributes representing the existing lighting system specifications and parameters derived from available existing datasets.
 - ESCO must reconcile existing luminaire locations defined by City and PECO database attributes
- Audit Status Layer
 - Multiple attributes representing real time audit status
- Post-Audit Layer
 - Multiple attributes representing the lighting system specifications and parameters observed during the investment grade field audit
- Preliminary Design Layer
 - Multiple attributes representing the preliminary design specifications
- Final Design Layer
 - Multiple attributes representing the final design specifications
- Installation Status Layer
 - Multiple attributes representing real time installation status
- As-Built Layer
 - Multiple attributes representing the final as-built installation specifications
- Verification Status Layer
 - Multiple attributes for use with installation and M&V period verifications
- Investment Grade Field Audit
 - ESCO is required to complete a comprehensive investment grade field audit of the City's existing lighting system, including but not limited to the following requirements:
 - Link actual luminaire audit GPS (lat/lon coordinates) location to a pre-audit reconciled (between City and PECO locations) existing luminaire location. If necessary, reposition pre-audit reconciled existing luminaire location to actual luminaire audit location. If an actual luminaire audit location can be linked to a

pre-audit reconciled existing luminaire location record then it will be considered “matched” and if not, “not matched.”

- Capture all the data attributes defined in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1) identified as having a Field Audit (Observed) source. Completion status of the field audit should be reflected in the **GIS Webmap Audit Status Layer** identified in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1).
- Based on field audit observed data and other logic assumptions, generate additional attributes identified in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1) as having a Field Audit (Generated) source.
- Upon completion of field audits, the **GIS Webmap Post-Audit Layer** should be developed and published.
- City to review the **GIS Webmap Post-Audit Layer** and identify actual audit luminaire locations that are not owned or maintained by the City. Those records should be identified with an Audit Status of Out of Scope – Municipality.

- **3.1.4 Preliminary Design**

- ESCO to schedule and lead a **Preliminary Design Planning Meeting** with the City and any key ESCO team members and partners to discuss all aspects of the preliminary design process.
- Develop and present to the City a **Preliminary Design Strategy** that standardizes luminaire selection based on typical applications using key criteria including, but not limited to, road classification, road configuration/specifications (e.g. lane width, lane count), pole configuration (e.g. one-sided, staggered, opposite/soldiered), pole spacing, pole context (mid-street or intersection), luminaire mounting height.
 - Based on audit data, the ESCO will work with the City to possibly modify or re-define typical applications identified in the RFP that can be used throughout the City as part of an overall design strategy. It is likely that the City will request the addition of typical applications for a variety of intersections with crosswalks. The ESCO will prepare a photometric analysis document for each new or modified typical application.
 - All City streets (or sections thereof) will be associated with a typical application type (e.g. Collector). This will allow each luminaire location to in-turn to be assigned to a typical application.
 - Each typical application shall have an associated luminaire solution as defined by the ESCO provided RFP solutions.
 - The preliminary design will also utilize and incorporate a City preferred Lighting Management System selected from the RFP options. Luminaires already converted to LED shall be included in the LMS scope of work.
 - Spring City decorative luminaire will also be part of the Preliminary Design Strategy but will be upgraded on a 1-for-1 basis using current Spring City LED luminaire specifications (Attachment A.4). Both upgraded LED Spring City luminaires and existing HID luminaires shall be included in the LMS scope of work.
 - Apply the above design strategy to create a system-wide preliminary design that specifies luminaire solutions for every location.

- ESCO will develop the **GIS Webmap Preliminary Design Layer** to reflect the system-wide preliminary design and present to the City. Attributes expected to be part of the WebMap Preliminary Design layer are listed in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1).
- ESCO to develop and present to the City a Preliminary Design Report that includes the following content:
 - Executive Summary
 - Statement of City Project Goals
 - Project Scope of Work Summary
 - Financial Summary with Total Operating Cost Savings, Total Project Costs and Project Payback
 - Existing Baseline Tables
 - PECO Current Bill Summary (by Luminaire Type Code), including:
 - Quantity
 - Watts/Luminaire
 - Total kW
 - Annual Operating Hours
 - Total kWh/Year
 - Total Annual Energy Consumption Cost
 - Total Quantity of Service Locations and Annual Service Location Cost (not by Luminaire Type)
 - Audit Verified Lighting System Summary (by Luminaire Category & Type Code), including:
 - Quantity
 - Watts/Luminaire
 - Total kW
 - Annual Operating Hours
 - Total kWh/Year
 - Total Annual Energy Consumption Cost
 - Total Service Location Quantity and Annual Service Location Cost (not by Luminaire Category & Type)
 - Comparative Difference Table (between current PECO Bill and Verified Audit)
 - Fixture Luminaire Quantity Difference
 - Total kW Difference
 - Total kWh/Year Difference
 - Total Annual Energy Consumption Cost Difference
 - Total Service Location Quantity Difference
 - Total Annual Service Location Cost Difference
- Summary of Preliminary Design Strategy
 - Discussion of design strategy with a standardized approach for luminaire selection based on road classification, road configuration/specifications, pole configuration, luminaire mounting height, etc.
- Project Costs, Savings and Financial Overview
 - Energy Cost and Savings Summary Tables
 - Comparison of unique combinations of audit-verified luminaire categories & types and proposed preliminary design luminaire categories & types, including:

- All the following for both audit-verified luminaire types and proposed preliminary design luminaire types.
 - Quantity
 - Watts/Luminaire
 - Total kW
 - Annual Operating Hours
 - Total kWh/Year
 - Total Annual Energy Consumption Cost
 - Total Service Location Quantity and Annual Service Location Cost (not by Luminaire Type)
 - Total Annual Energy Consumption Savings
 - Total Annual Service Location Savings
 - A 1.5% annual energy rate escalation should be assumed for each year of the entire 20-year GSA period.
- Maintenance Cost and Savings Summary Tables
 - Comparison of unique combinations of audit-verified luminaire categories & types and proposed preliminary design luminaire categories & types, including:
 - All the following for both audit-verified luminaire types and proposed preliminary design luminaire types.
 - Quantity
 - Total Annual Maintenance Costs
 - Total Annual Maintenance Savings
 - ESCO to propose and City to approve maintenance savings assumptions. ESCO should assume difference maintenance savings factors during the product warranty period (e.g. 0-10 years) and during the remaining years of the GSA term (e.g. 11-20 years). No annual maintenance cost escalations should be assumed during the entire 20-year GSA period.
- Summary Project Cost Table (by luminaire category and type)
 - Material Costs (both purchase price and 20-years of annual fees)
 - Install Costs
 - ESCO Fees
 - Contingency
 - Finance Costs
 - Rebates
 - Total Net Cost
- Payback Analysis Table (by typical application)
 - Operating Cost Savings
 - Annual Energy Savings
 - Annual Maintenance Savings
 - Annual Total Operating Cost Savings (total of above)
 - Methods of all savings calculations to be confirmed with City
 - Project Costs
 - Material Costs
 - Install Costs
 - ESCO Fees
 - Contingency

- Finance Costs
 - Rebates
 - Total Net Cost
- Payback (Years)
- 20-Year Cash Flow Analysis
 - In addition to 20 separate post-construction years represented, also include initial pre-construction periods for the Design period and the Construction period
 - Cash flow to show summary project cost assumptions including:
 - Construction Cost (material and labor)
 - ESCO Fees
 - Other Fees
 - Contingency
 - Total Project Cost (summation of above items)
 - Capital Contribution
 - Finance Principal Amount
 - Finance Interest Rate
 - Finance Term
 - Finance Payment Amount
 - 20-Year Cash flow to include the following columns:
 - Annual Energy Savings (with specified escalations)
 - Annual Maintenance Savings (with specified escalations)
 - Annual Total Savings (total of above)
 - One-Time Rebates (Year 1 only)
 - Annual Fees (e.g. LMS license fees, communication costs)
 - Annual Finance Payments
 - Net Savings

- **3.1.5 Final Product Evaluation/Selection**

- ESCO to schedule and lead a **Product Evaluation/Selection Planning Meeting** with the City and any key ESCO team members and partners to discuss all aspects of this process.
- As part of this RFP process, the ESCO shall provide manufacturer solutions (e.g. luminaires and LMS components) that will be considered a “committed” basis of design. If the City chooses to accept a solution offered in the RFP response, it would expect all technical/performance specifications and pricing to be maintained or improved for use throughout the entire term of the project defined by this RFP.
 - ESCO will complete a **Transparent Product Evaluation and Selection Process** that will identify additional qualified manufacturer solutions that exceed the total value (defined below) of the RFP “committed” basis of design.
 - ESCO will meet with City prior to starting this effort to review the proposed evaluation and selection approach and solicit input on that approach and expected results.

- Final product selections will be for a single manufacturer per product family (e.g. cobrahead luminaires, LMS) and not a single manufacturer for all solutions. It is expected that a single manufacturer solution be selected for the LMS. The LMS does not have to come from a selected luminaire manufacturer and shall work with any and all selected luminaire manufacturers.
- The City expects to see 3-10 qualified manufacturer solutions evaluated per product family.
- Evaluation and selection will be based on solutions that provide the best long-term value to the City. ESCO must work with the City to develop a weighted scoring approach that utilizes the following metrics:
 - 20-Year Total Cost of Ownership (TCO) Metric
 - Scoring weight to be determined by City, but expected to be 50% or greater
 - Lower relative TCO results in higher score
 - Components of TCO
 - Purchase price
 - All manufacturer costs to be supplied and documented with a manufacturer quote as Distributor Net (D/N) costs and to be held for 36 months with annual % escalations established after that term.
 - The ESCO will identify a “Preferred” Distribution Partner as part of the RFP submittal. In the RFP Submittal Worksheet (Attachment A.1), the ESCO will provide the transparent distribution partner % markup (not margin) to manufacturer D/N cost. For example, a 5% markup on a \$100 D/N cost product would result in the correct City price of \$105 ($\100×1.05). A 5% margin calculation would incorrectly result in a City price of \$105.26 ($\$100/.95$).
 - 20-Year Operating Costs
 - Total energy consumption costs over a 20-year period based on current tariff rates and 4,092 annual operating hours.
 - All manufacturer solutions must assume a dimming factor such that all meet the same pre-defined specified lumen output.
 - For LMS solutions operating costs may not be defined as energy costs but rather annual operating costs (e.g. license fees, communication costs).

- Total maintenance costs (assuming 10-year warranties) over a 20-year period.
 - Assumptions to be discussed and confirmed with City.
- Lighting Performance Evaluation Metric (Luminaires only, not LMS)
 - Scoring weight to be determined by City, but expected to be 50% or less
 - ESCO and City to discuss evaluation approach, but generally looking to identify relatively higher performing luminaire solutions, including but not limited to the following assessments:
 - Luminaire Illumination and distribution performance
 - Luminaire glare, shielding options and source brightness control options
 - Luminaire color rendering index
- Construction and Certification Metric
 - Scoring weight to be determined by City, but expected to be 50% or less
 - ESCO and City to discuss evaluation approach, but generally looking to identify manufacturer solutions with better product construction, including but not limited to the following assessments:
 - Construction specifications
 - City would request a luminaire sample be provided for all proposed product solutions. Luminaire samples should be supplied with a 10' cord and plug and will be used for a "tabletop" assessment.
 - Industry recognized certifications
 - Ease of installation
 - Ease of maintenance
- Warranty & Market Presence Metric
 - Scoring weight to be determined by City, but expected to be 50% or less
 - ESCO and City to discuss evaluation approach, but generally looking to identify manufacturer solutions with better warranties and market presence, including but not limited to the following assessments:
 - Standard warranty term (years) assumed with no additional costs
 - City specific warranty term (years) with no additional costs
 - Additional extended warranty term (years) and associated costs
 - Warranty exclusions and resolution for failures above industry/manufacturer standards
 - Product time in market and volume
- General Manufacturer Capability Metric

- Scoring weight to be determined by City, but expected to be 50% or less
 - ESCO and City to discuss evaluation approach, but generally looking to identify manufacturer capabilities, including but not limited to the following assessments:
 - Experience with similar projects
 - Order and Freight minimums
 - Lead times including order processing, production and shipping
 - Origin of manufacturer
 - Ability to provide sample fixtures
 - Ability to support trial installations (see community outreach section)
- Discussion of “Preferred” Distribution Partner and Installation Partner.
 - The RFP references “Preferred” partner selections for a distributor and installer. The “preferred” indication is intended to give the ESCO the ability to identify at the time of RFP submittal the partner for those services that they intend to work with.
 - No ESCO team partners represented in the RFP can be exclusive to this ESCO team, and those partners should be able to participate and support other ESCO teams.
 - If the selected ESCO would like to change the partner prior to the start of the Project Development Phase, the City would consider this recommendation. There is no requirement for the ESCO to recommend a change from the preferred partners submitted with the RFP.
 - The City would require the ESCO to justify the added value of a proposed partner. Added value could be defined as lower costs, improved productivity or similar factors. The City would not allow any markups or unit costs for these partners to increase from that provided in the RFP. For example, the maximum allowed distributor markup for this project, regardless of who is approved as the final distribution partner, would be that provided in the RFP. The same rationale that the RFP sets for the maximum installation unit pricing would apply to the final approved installation partner.
 - While the City prefers the selection of a single Distribution Partner, they would consider the selection of multiple (no more than 3) qualified local/regional Installation Partners.
 - It should be noted, the City views the selection of the final approved distribution or installer partner as a good opportunity to meet diversity goals (e.g. Minority-, Woman-, and Disabled-Owned Business Enterprises participation) outlined in Section 4.3.6 of this RFP.
- ESCO will prepare and present a summary of the results from the above activities, providing the City with full access to all supporting detailed analysis documents. This will be considered the **Final Evaluation and Selection Report**.

- **3.1.6 Community Outreach/Trial Installation**

- ESCO to schedule and lead a **Community Outreach Planning Meeting** with the City and any key ESCO team members and partners to discuss all aspects of this process.
- Community Outreach requirements defined in Section 2.3.3 of this RFP.
- ESCO should plan to install (20) twenty **Trial Installation** locations with the following requirements:
 - Trial installation efforts to start immediately upon completion of the Final Product Evaluation/Selection
 - The above process should inquire with all considered luminaire and LMS manufacturers their willingness to support a free trial installation program (preferred) or a try-before-you-buy program.
 - Install (4) luminaires per location selected based on the typical application and recommended luminaire solutions.
 - Trial installation location should specify (4) adjacent luminaires for one-sided street pole patterns or (4) luminaires grouped for staggered or opposite street pole patterns.
 - To evaluate Correlated Color Temperature (CCT), (2) adjacent luminaires should be 4000K CCT and (2) adjacent luminaires should be 3000K CCT.
 - Install a cellular NLC on each luminaire as part of manufacturer supported trial to allow for dimming adjustments for illumination assessments.
 - ESCO responsible for installation and removal of all trial luminaires. Original luminaires to be maintained for possible re-installation by ESCO.
 - ESCO will prepare and present a **Community Outreach Report** describing all above activities, results and feedback for use with any City constituents or decision makers. Multiple presentation meetings may be required with different City groups. All evaluation and outreach will require City approval.

- **3.1.7 Final Design**

- ESCO to schedule and lead a **Final Design Planning Meeting** with the City and any key ESCO team members and partners to discuss all aspects of this process.
- With consideration of feedback from the Preliminary Design phase, community outreach, trial installations and product evaluations/selection, the ESCO shall create a **Final Design Plan**.
- Develop and present to City a final design strategy that standardizes luminaire selection based on Typical Application parameters and specifications.
 - The final design will utilize final product selections for luminaires and LMS
 - Apply the above design strategy to create a system-wide final design that specifies luminaire types for every location.
 - The ESCO will update the photometric analysis for all typical applications (developed in the preliminary design phase) using final luminaire selections.
- Update the **GIS Webmap Final Design Layer** to reflect the system-wide Final design and present to City. Attributes expected to be part of the WebMap Final Design layer are listed in in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1).
- Develop and present to City an **Investment Grade Audit Report** that includes all the same content defined in the Preliminary Design Report described in section 3.1.4 above. This Investment Grade Audit Report format will be deemed as the Volume 2 report of the

2 Volume requirement outlined in the Guaranteed Energy Savings Contract (GESc) (Attachment X). Volume 1 formatting and content requirements are defined in the GESc. This meeting will be considered the **Final Design Meeting**.

- The ESCO will work with the City to make any **final adjustments to the Final Design and associated Investment Grade Audit Report** and also assist with the development of any materials required for a presentation, assisted or led by the ESCO, to City decision makers as required.

3.2 Phase 2: Implementation

• 3.2.1 Procurement/Pre-Construction

- During this phase the City expects the ESCO to **order all materials from the selected distribution partner**. If the ESCO recommends a phased approach to installation and ordering materials that must be discussed with the City.
 - On a weekly basis the ESCO's distribution partner should provide **Material Status Reports** with order date, expected manufacturer ship date, distributor receipt date, delivery date to ESCO install Partner for all product line items on purchase orders.
- ESCO to schedule, manage and lead a **Pre-Construction meeting** with the City and the ESCO Install Partner(s). Project logistics would be reviewed and agreed upon including, but not limited to:
 - Project Start Date and Schedule
 - Network Infrastructure Installation/Development
 - Preferred Order or Phasing of Luminaire/NLC Installation (e.g. geographical, fixture type or other priorities)
 - Material Staging (if requested or needed)
 - Safety Requirements (contractor and municipality)
 - Special Considerations (e.g. events impacting installation)
 - Pre-Approved Field Changes
 - It is in the best interest for all parties, to pre-approve field changes that allow the contractor to make low-cost changes at the time of fixture installation. A common field change required is to "re-wire" the connection from the fixture to the PECO tap location.
 - A list of pre-approved field changes will define a pre-negotiated price for any pre-approved field change, daily quantity limits per install team and communication procedures for both pre-approved changes and changes needing approval.

• 3.2.2 Installation & Project Management

- Installation
 - The ESCO Installer Partner is responsible for **implementation of all construction plans** reviewed and approved by the City in the Pre-Construction phase.
 - Installation Tracking
 - City requires ESCO to work with their Audit/GIS partner to develop a field-based tablet **Installation Tracking Application** that reflects the

WebMap Construction Status Layer and allows the ESCO Install Partner(s) to record real-time installation status. Attributes expected to be part of the WebMap Construction Status Layer are listed in the Lighting System DB Attributes tab of the RFP Submittal Worksheet (Attachment A.1).

- ESCO Installer Partner is responsible for **identifying all unplanned conditions** impacting the construction plan. When conditions can be resolved with pre-approved field changes, the ESCO Installer Partner should conduct and document that work in the Installation Tracking Application.
 - For any conditions or issues identified that are not covered by pre-approved field changes, the ESCO Installer Partner must **document the condition** in the Installer Tracking Tool and also communicate via email to pre-identified ESCO Team members and City contacts.
 - All luminaires removed by the Contractor to be scrapped, unless otherwise instructed by the City, will become the property of the Contractor and must be disposed of in full compliance with environmental regulations. Revenues from material recycling will accrue to the Contractor and should be used to reduce the Contractor's price for installation of the Project under the Contract.
- Project Management
 - ESCO is responsible for managing all aspects of the installation by the ESCO Install Partner(s) including, but not limited to, the following tasks:
 - Project Status Meetings
 - ESCO will schedule and manage **Project Status Meetings** every 2 weeks during the construction period, including participation by the City, the ESCO Install Partner(s) and the ESCO LMS manufacturer partner. During those meetings the following topics should be discussed:
 - Installation Progress Status Report (also reflected in GIS Web Portal)
 - 2-Week Look Ahead for Installation defining geographical areas and typical application types for activity.
 - Open Issues Review & Resolution Status
 - Open issues should be tracked by categories, including but not limited to: warranty repairs, added maintenance requirements, resident complaints, etc. Open issues that result in an add or deduct to the original project scope should be linked to a pending/approved change order.
 - All open issues not resolved at time of substantial completion should move to the project punch list.
 - The ESCO should maintain an online document showing the most current version of an **Open Issues Tracking Report**.
 - Change Order Status
 - ESCO is responsible for identifying all possible change orders for the project and submitting

them to the City for consideration and possible approval. The ESCO should maintain an online document showing the most current version of a **Change Order Tracking Report**.

- Punch List Status
 - At the time of substantial completion, the ESCO will issue a punch list of items pending resolution. The ESCO should maintain an online document showing the most current version of the **Project Punch List Report**.
- ESCO and ESCO Partner(s) Payment Status
 - ESCO will have the ability to submit for payment applications based on an initial mobilization fee to be determined and for materials received.
 - ESCO is responsible for submitting payment requests to the City for review and approval on a monthly basis during the construction based on installation progress. The ESCO should include any Partner payment applications to the ESCO that reflect costs that this RFP indicates should be transparent to the City, including those from the ESCO Installer Partner and the ESCO Distribution Partner.
 - ESCO shall maintain a 5% retainage until Final Completion is achieved.
- The ESCO Audit/GIS partner is responsible for the development of a web-based **Construction Dashboard** utilizing consistently updated data represented in the Construction Status and all previously developed/populated GIS layers defined in the LSDB in Attachment A.5.
- During the construction process, the ESCO will present documentation for City review and acceptance the following items:
 - Monthly LMS performance confirmation
 - Monthly luminaire installation and operation confirmation
 - Monthly installation progress billing
 - Monthly PECO bill update support
 - Quarterly PECO rebate submittal support
 - Annual PJM rebate submittal support
- Research Support
 - The City intends on conducting relevant research that provides pre- and post-upgrade comparative metrics pertaining to safety and other important factors. One specific research effort will require **support from the ESCO Team** and is briefly described here:
 - Researchers working with the City will identify a set of replaced luminaires for laboratory testing to IES LM-31; contractor to document their precise location when taken down, set aside and then handled/shipped in a manner that does not disturb the as-found condition (e.g., dirt accumulation on lens). Shipping and testing costs will be borne by the researchers.

- The researchers will also identify a set of replacement LED luminaires for laboratory testing to IES LM-79; these can be shipped to the testing lab directly from the facilities warehouse and will be returned to the warehouse after testing. In some cases, these may be specifically associated with a given location of intended installation, so might also require some form of labeling. Shipping and testing costs will be borne by the researchers.

• 3.2.3 Project Close-Out

- ESCO should issue a **Substantial Completion Form** for the City to review and approve, when the following conditions have been met:
 - LMS CMS and network devices (e.g. gateway) are installed and operating to specifications.
 - All luminaires and NLC's in the original scope of work have been installed and at time of installation were operating to specifications..
 - All NLC's have been commissioned and programmed with an initial defined dimming schedule.
- ESCO should issue a **Final Acceptance Form** for the City to review and approve, when the following conditions have been met:
 - Substantial completion previously achieved
 - All punch list items have been resolved
 - All change orders have been approved
 - All ESCO Install Partner(s) pay applications have been paid

• 3.2.4 PECO Bill Updates & Rebate Management

- PECO Bill Updates
 - ESCO to assist the City with the set-up of a new PECO streetlight account(s) for luminaires to utilize PECO's SL-C tariff. The SL-C tariff has unique submittal requirements for the approval and set-up of new SL-C accounts.
 - On a monthly basis the ESCO will support the City with PECO account inventory updates. Based on installation progress the City will submit luminaires to be updated on the existing PECO SL-E and Alley tariff accounts and subsequently added to the new PECO SL-C tariff account.
 - As needed, the ESCO will support the City with providing SL-C 1st verification data as required by the tariff.
 - On an annual basis the ESCO will support the City with providing SL-C verification data as required by the tariff.
- PECO Rebates
 - During the Product Evaluation and Selection process the ESCO **should confirm that all final product selections are qualified for PECO rebates or can be approved for those rebates.**
 - ESCO to work with the PECO rebate management team to submit all **Preliminary and Final Rebate Applications** associated with Act 129 rebates. All PECO rebates will be paid directly to the City.
 - ESCO to work with the City and PECO to define a process for quarterly rebate submittals during the construction process.
- PJM Rebates

- ESCO to support the annual process for **submitting for PJM rebates**. All PJM rebates will be paid directly to the City. Any broker involvement and associated fees must be transparently discussed with the City.

- **3.2.5 Project Documentation**

- ESCO to deliver an **O&M Manual** including, but not limited to, the following items:
 - Project Key Contacts
 - Project Summary Bills of Material & Systems
 - Product Data/Cut-Sheets
 - Installer and Manufacturer Warranty Processes
 - Pricing and Additional Ordering Process
 - Operations & Maintenance Recommended Practices, including but not limited to:
 - LMS & GIS Portal Training Manuals
 - LMS & GIS Portal Operating/Trouble-Shooting Manuals
 - Standard Dimming Schedule Sequence of Operations
 - Alarm and Report Specifications
 - Cleaning Recommendations

3.3 Phase 3: Measurement and Verification (M&V)

- **3.4.1 M&V Services, Analysis & Reporting**

- For the purposes of this RFP the ESCO should assume the City is requiring (3) M&V annual periods starting as of the Substantial Completion date defined in the GESC (Attachment B).
- The City requires a M&V process and report that confirms the ESCO is meeting its energy savings guarantees and the lighting system is operating within specification and performance requirements. The City only wants M&V services, analysis and reporting that are relevant and of value to the City.
- At a minimum, the following M&V services and analysis must be completed and documented in the annual **M&V Report**:
 - **PECO Bill Analysis**
 - Comparison of Baseline (pre-project) PECO SL-E tariff account energy costs to actual M&V period PECO SL-C tariff account energy costs to establish M&V period savings. M&V period savings are then compared to the Guaranteed Savings defined in the Investment Grade Audit Report to determine if there is a savings deficit or surplus.
 - When calculating M&V period PECO SL-C tariff account energy costs, the same energy consumption and service location charge rates used in the Investment Grade Audit Report should be applied against actual kWh usage and service location quantities.
 - **Field Sampling of Luminaire Operation**
 - A sufficient quantity of luminaires, such that at least 50-100 luminaires per final typical application, should be evaluated at night for normal

operation. ESCO will utilize a tablet-based verification tool developed by the ESCO's Audit/GIS partner that allows for the documentation of luminaire performance (e.g. on, off, flickering, abnormally dim, abnormally bright).

- **System-Wide Evaluation of Luminaire and LMS Operation**
 - ESCO shall run LMS reports on a defined date looking back over the previous 28 days that indicate the overall luminaire and LMS performance, including, but not limited to, the following metrics:
 - Total % of NLC's Communicating with Gateways
 - Total % of Luminaires Operating with Normal Operation
 - Total % of Luminaires with LED Outages
 - Total % of Luminaires with Dayburning Status
 - All LMS reports should differentiate between temporary faults that resolve quickly (possibly due to data interruptions) and those that are persistent indicating likely operating failures.

4.0 ESCO Project Team

4.1 ESCO Project Team Requirements

The City is looking for an ESCO Team that has relevant experience with large complex streetlighting upgrade projects for cities or other large municipalities. The City understands that the strongest team will likely be a combination of ESCO experts and leaders as well as sub-contractor partners that specialize in lighting upgrade projects. While the City expects and looks forward to direct interaction with the ESCO partner companies, the ESCO is responsible for all communication, activities and deliverables from those partners.

This RFP allows ESCO's to submit sufficient information to show the entire team's capabilities including an ESCO Team Organizational Chart, ESCO Team Profile, ESCO and Partner Reference Projects and ESCO General Responses in the RFP Submittal Worksheet (Attachment A.1).

The City has outlined diversity goals for this project in the Antidiscrimination Policy (Attachment C). It is expected that these goals can be achieved through the selection of ESCO Team partners.

The City is also seeking an ESCO with the financial capacity to manage all elements of the required work. This will be evaluated based on audited financials, credit rating and outstanding claims. The ESCO must be able to meet the terms of the Pennsylvania Guaranteed Energy Savings Act (GESA) to mitigate risk on the project performance through performance bonds, parent guarantees, or other means.

5.0 Luminaire Specifications

5.1 Approach for Defining Specifications

For the purpose of this RFP, it is expected that the ESCO will provide luminaire solutions for all the Typical Applications defined in the Luminaire Tab of the RFP Submittal Worksheet (Attachment A.1). At this time, each Typical Applications will require either a cobrahead, dusk-to-dawn or decorative luminaire solutions. After an ESCO is selected the City may expand the Typical Applications to include other luminaire types that the ESCO should expect would have similar performance specifications.

All LED Luminaires must have the following minimum specifications and preferred options:

- Luminaire Efficacy
 - Lumens/Watt greater than 100 for cobrahead and dusk to dawn luminaires
 - Lumens/Watt greater than 70 for decorative luminaires
- Application Performance
 - Photometric performance for defined Typical Applications further defined Attachments A.1 and A.2
- Lumen Maintenance
 - Greater than 95% Lumen Maintenance @ 36,000 (based on TM-21 calculations)
- IES Distribution
 - IES Type II, III, IV, and V options for cobrahead luminaires
 - Special backlight sidewalk distributions may be required meet sidewalk photometric requirements.
 - Variations of above standard distribution types will be evaluated.
 - IES Type II/III or Asymmetric and IV/V or Symmetric for decorative luminaires
 - IES Type V distribution for dusk to dawn luminaires
- Shielding & Source Brightness Control
 - House-Side Shield for cobrahead luminaires required, other options preferred include Side Shield, Cul-de-Sac Shield, Front-Side Shield
 - Prefer options for source brightness control
- Uplight
 - BUG Rating U0 for cobrahead luminaires
 - Minimized uplight for all other luminaire types
- Color Rendering Index (CRI)
 - CRI > 70
- Correlated Color Temperature (CCT)
 - Required 3000K and 4000K CCT options (+ or – 200K)
- Warranty
 - Minimum warranty terms of 10-years with an option for additional extended warranty period
- Surge Protection (ANSI C136.2 “Enhanced”)
 - Minimum 10kV rating with option for 20kV
- Construction
 - IP66 Rating

- Tool-Less Maintenance Access for component repair/replacement (e.g. driver)
- Type I Vibration Rating (ANSI C136.31) with option for Type II
- Receptacle Control Interface (ANSI C136.41)
 - NEMA 7-Pin
- Color
 - National Park Brown or Bronze Finish for cobrahead luminaires (many pole types) and residential decorative luminaires (pole types PTA, PTF and PTC)
 - Specified colors for Spring City luminaires
 - Grey for dusk-to-dawn luminaires
- Driver
 - Available in both 0-10V and DALI 2 D4i dimming options
 - Universal Voltage 120-277 VAC
- Certifications
 - PennDOT Bulletin 15 Qualified for cobrahead luminaires
 - If not qualified, a defined plan and timing for qualification must be provided
 - DesignLights Consortium (DLC) listed for PECO Rebate Qualification or PECO approved documentation to meet DLC requirements

All the above luminaire specifications are also listed in Luminaire tab of the RFP Submittal Worksheet (Attachment A.1). **If any of the above specifications cannot be met it must be noted by the ESCO in their RFP response.**

6.0 Lighting Management System Specifications

6.1 Lighting Management System Overview

For the purposes of this RFP a Lighting Management System (LMS) is defined as a networked system of luminaire network lighting controls (NLC), gateways (if required), a central management system (CMS) with a browser-accessible graphical user interface (GUI) and, if required, a network management server (NMS).

The City requires a LMS that will provide the following benefits:

- Improved lighting control and performance that supports greater vehicular, bicycle and pedestrian safety.
- Improved lighting control and performance that meets the general safety and quality of life needs of neighborhood residents.
- Improved lighting control and performance that generates operational efficiencies reducing energy and maintenance costs.

The City is open to multiple LMS architecture, topology and network options. This RFP will allow multiple solutions, submitted as a committed basis of design, to be proposed through the Controls tab of the RFP Submittal Worksheet (Attachment A.1). Final selection of a preferred LMS will be based on evaluation criteria defined in the previous section discussing Product Evaluation and Selection.

The City is interested in a LMS that has the following functional capabilities:

- LMS shall be capable of performing all functions and meeting the requirements described herein for a minimum of 175,000 Control Points.
- LMS shall constantly monitor the operational status and performance parameters of all connected lighting or other assets.
- LMS shall be programmable to define luminaire groups and lighting schedules that meet City illumination requirements and goals.
- LMS shall proactively identify and deliver user-defined alarms and reports that support City operations and work processes.
- LMS shall track historical point-in-time operational status and performance parameters for all connected lighting or other assets. For some parameters the LMS should keep cumulative running total measurements (e.g. kWh, operating hours).
- LMS shall maintain luminaire and control component asset data and if applicable utilize DALI 2 D4i data.
- LMS shall allow users to access, via a secured internet connection, all LMS information and functions through GUI versions for computers, tablets and smart phones.

LMS shall allow for data and operational integration with other City systems in compliance with City integration requirements.

6.2 Lighting Management System Specifications

All LMS proposed solutions must adhere to the following City requirements and specifications:

- LMS must be a PECO qualified solution
 - LMS must be approved by PECO as a qualified manufacturer system as defined by the PECO SL-C tariff.
- LMS Ownership, Users and Warranty
 - LMS must have City licensing options direct with the ESCO LMS manufacturer partner of no less than 5 years but no more than 20 years. The LMS license would cover all required manufacturer system/hardware updates, system maintenance and support for warranty-related claims or other technical issues requiring support. The annual license fees should cover **all costs** beyond the initial purchase of hardware and

can exclude 3rd party communication costs (i.e. cellular) and 3rd party network management services.

- License agreement must allow for identified City users to have full access and permission to administer, customize and control the LMS. The City assumes that at least 5 staff members would require full administrator status and 20 other staff members would require partial permission levels to be defined.
 - The City expects all LMS hardware components have a warranty period that matches the selected license term. If any premium is required for warranty periods beyond 10-years, the cost should be included in the associated license fees for those terms.
 - The City expects the license fees to include technical support for remedy of network communication faults.
 - The ESCO LMS manufacturer partner shall provide a client Help Desk staffed 24 hours per day, 7 days per week, 365 days per year and must utilize a resolution process that creates service tickets that stay open until City confirmation of resolution. Service tickets should be time stamped for opening, any documented updates and closing.
- LMS Backhaul Network
 - For the purposes of this RFP, the City defines the backhaul network to span all connections from individual field devices back to a Central Management System. The City understands that the backhaul network may use different communication protocols for different sections of the backhaul network (e.g. RF from luminaire node to gateway and cellular from gateway to central management system).
 - The City is open to multiple network communication types/protocols including Radio-Frequency (RF), Cellular (LTE or 5G), Wi-Fi, Ethernet, Fiber. All network sections must be secure as defined by the City policies.
 - If the ESCO is proposing to use cellular networks, then the City preference would be a Private Network to ensure the devices are not reachable on the Public Internet. In this instance, 4G would be preferred. The City does not have a preferred cellular carrier but does have existing contracts with AT&T Mobility, Sprint, and Verizon. The ESCO LMS manufacturer partner will be asked to list all carriers to which their system communicates.
- LMS Compliance with City OIT Data and Security Standards
 - LMS must comply with all City security and architecture policies as defined by the following documents and represented in Attachment A.3:
 - Information Security Governance Policy City of Phila OIT
 - Data Management policy City of Phila OIT (draft)
 - Data and API policy City of Phila OIT (draft)
 - Data Requirements, Addressing, Digital and Web Content Accessibility (draft)
- LMS Integration to City Systems
 - LMS must have the ability to provide all available information/data to the City's Databridge data integration platform. The ESCO shall coordinate with the CityGEO staff to ensure that all data collected by the LMS is directed to the City's DataBridge Warehouse where all relevant departments/systems can easily access the information. The central integration point for the LMS for all other systems will be the DataBridge. A data dictionary for all LMS data attributes must be provided. Below are likely City systems that will utilize LMS information/data.
 - City Streets Maintenance Integration

- The City is interested in having critical LMS information/data (e.g. outage alarms) integrated with their CityWorks work order system.
 - City GIS and Lighting inventory/asset management system integration
 - City 911, 311 and Traffic Management Integration
 - For all LMS integration to City systems, final system interface requirements and designs would be delivered as part of implementation services and will be determined in partnership with the City once the award is issued.
 - The City is also interested in the option to integrate other data input sources over time into the LMS. Data from these sources may be leveraged as part of an overall adaptive lighting strategy.
 - The LMS must communicate with defined useful real-time data (e.g. faults, alarms) as well as regularly scheduled status, performance and asset reporting information.
- **LMS Key Components**
 - LMS Field Devices
 - LMS field devices include Network Lighting Controllers (NLC), Gateways (if required), and Smart City attached components (discussed in a following section) including smart city hubs/processors, sensors, cameras and microphones.
 - LMS Network Management Server (NMS)
 - Some system designs may require the use of an NMS connected with gateways ensuring maximum system reliability and security.
 - LMS Central Management System (CMS) with a browser-accessible Graphical User Interface (GUI)
 - The LMS Central Management System shall be hosted by the ESCO LMS manufacturer partner. The hosting facilities should meet industry standards and have appropriate certifications.
 - FedRAMP compliance is preferred for cloud-based products.
 - The City requires at least two (2) geographically diverse data centers; and Data Centers must meet Tier III Standards addressing: Hardware redundancy; Power redundancy; Telecommunications redundancy; and Building integrity (HVAC, Security, Fire Suppression, etc.).
 - The overall solution should provide mechanisms for testing changes prior to rollout into production environments, and training end users
 - The proposed solution should include automatic backup and recovery capability, ensuring continuous operation with limited interruption or degradation of services. The City prefers a solution where the system may be recovered quickly in the case of unforeseen event. Other mitigation methods to handle outage periods are also preferred.
 - The Proposer should maintain Backup and Recovery Plans and procedures to limit the impact to City operations.
 - The LMS Central Management System (CMS) and GUI (browser application) should have the following features and capabilities:
 - Real-time Monitoring, Control and Scheduling – control individual lights, or groups of lights, by sending on/off/dim commands in real-time or with customizable, preprogrammed schedules.

- Maps Interface – locate and control lights via a Maps interface, including street and satellite views, with color-coded images that indicate status.
 - Reports & Dashboards – generate and share reports based on time, events or user requests and provide a customizable dashboard with key status and performance information.
 - Fault Alerts – receive email or text alerts for faults such as day burners, burnouts, lamp cycling, ballast failures, over/under voltage, abnormal power consumption, low power factors, communication failures and more.
 - Asset Management – maintain all luminaire, pole and control component attributes.
 - Light Fixture Interoperability – work with any manufacturer luminaire with standard NEMA receptacle interface and industry standard driver as defined in this RFP.
- Provide a mobile-friendly application that will enable City staff to work remotely helping to streamline and the management and maintenance of streetlights
 - The City is interested in accessing LMS information with an internet connected mobile field device that allows for monitoring (status and performance) and control of individual luminaires.
- **LMS Functionality**
 - LMS Luminaire Group Creation
 - LMS should allow for the creation of luminaire groups based on user-defined criteria. NLCs must be able to be in multiple, possibly overlapping, groups.
 - LMS Luminaire Control
 - LMS must allow for real-time control of individual luminaires or pre-defined groups of luminaires including but not limited to on, off and user-defined dimming levels.
 - LMS Programming
 - LMS must allow for remote programming of user-defined lighting schedules for groups of luminaires that include the following parameters:
 - Discrete dimming levels (including on and off) at multiple time intervals, or...
 - Discrete dimming levels (including on and off) based on data-driven algorithms from sensors or other inputs (also known as adaptive lighting)
 - In addition to longer-term lighting schedules, the LMS should allow for special event (e.g. holidays, citizen gathering events) override schedules. It is assumed that after the expiration of the special event, the LMS will return operation to previous normal schedules.
 - LMS Measurement and Monitoring
 - LMS must monitor the operating status of connected lighting and other assets, including but not limited to:
 - LED source status (on/off/dimmed)
 - Driver Status
 - Communication status
 - Tilt status
 - Voltage Over/Under status

- Programming Schedule Type
- LMS must measure the performance parameters of connected lighting and other assets, including but not limited to:
 - Voltage
 - Current
 - Watts
 - Power Factor
 - Dimming %
 - Driver-specific parameters (e.g. drive current)
- All above operational status and performance parameters plus cumulative metrics, including but not limited to:
 - Cumulative kWh
 - Cumulative Operating (Burn/Use) Hours
- LMS Historical Data Maintenance
 - The City requires the LMS to maintain historical data for a minimum of 6 years for all the above operational status and performance parameters.
 - The LMS must provide the ability for historical data to be exported in commonly used data file formats (e.g. MS Excel, CSV).
- LMS Alarms and Reports
 - LMS must generate and immediately communicate via email and text the following alarms:
 - Tilt (indicating knockdown condition)
 - Incoming Power Outage (defined as no voltage to luminaire)
 - Incoming Power Under-Voltage/Brown-Out (defined as voltage % below a defined baseline)
 - LMS must generate reports based on a user-defined frequency (e.g. daily, weekly, monthly), including but not limited to:
 - Outage Report
 - Dayburner Report
 - Tilt Report
 - Voltage Over/Under Report
 - Low Power Factor Report
 - Utility Power Outage
 - In addition to the above pre-defined alarms and reports the LMS should allow for user-defined ad-hoc report development.
 - Alarms and Faults are key LMS data the City likely will need to be shared and integrated with other City systems (see LMS Integration section above).
- LMS Asset Management
 - The LMS must maintain key luminaire and pole asset attributes, including but not limited to the following:
 - Control Attributes
 - NLC Identifier #
 - NLC Type
 - NLC GPS location (lat/lon coordinates)
 - Gateway Identifier #
 - Gateway Type
 - Pole and Arm Attributes
 - Pole PECO #
 - Pole City #

- Pole Manufacturer
 - Pole Model #
 - Pole Material/Type
 - Pole Height
 - Pole Condition
 - Pole Image
 - Arm Material
 - Arm Length
 - Arm Orientation Angle
 - Arm Bend Angle
 - Arm Condition
 - Luminaires/Pole
 - Luminaire Attributes
 - Luminaire Manufacturer
 - Luminaire Model Number
 - Luminaire Color
 - Luminaire Wattage (at Full Light Output)
 - Luminaire Color Temperature (CCT in Kelvins)
 - Luminaire Installation Date
 - Luminaire Driver Manufacturer
 - Luminaire Driver Model #
 - Luminaire Driver Installation Date
 - Luminaire Warranty Expiration Date
 - Light and its associated circuitry, controller, power feed, and grouping
 - The City is considering use of DALI drivers which will maintain many asset attributes that can be shared to the LMS.
 - The LMS must provide the ability for asset data to be exported as with all other data as defined in the Data Integration section.
-
- **LMS Training and Support**
 - The ESCO LMS manufacturer partner shall provide detailed system and user documentation in the form of digital, searchable technical and user manuals.
 - Additionally, the ESCO LMS manufacturer partner will also provide the City with complete digital, searchable system implementation documentation concerning installation, configuration, testing, interfaces, and data conversion. The ESCO LMS manufacturer partner shall also provide .doc or.docx, and .pdf copies of all documentation listed above and unlimited downloads to updated copies.
 - The ESCO LMS manufacturer partner shall provide, in a timely manner, system documents that describe all software in sufficient technical and functional detail, so that this information may be used by City personnel to maintain the system and to resolve identified problems.
 - The ESCO LMS manufacturer partner shall provide training for all users and managers identified by the City. All training materials must be made available to the City in electronic format. All training sessions must be recorded for future

reference. All training costs should be included as part of hardware purchases or the annual license fee and not as a separate cost.

- The ESCO LMS manufacturer partner must provide on-going support contract options that match the license term for non-warranty related technical support. All support costs should be included as part of hardware purchases or the annual license fee and not as a separate cost.

6.3 LMS Implementation Requirements

This section defines the City expectations for design, installation, commissioning and training/support of the LMS:

- Phase 1 – LMS Design & Planning
 - The ESCO's LMS manufacturer partner should utilize field audit data to identify and geo-locate the NLC locations and total quantities.
 - The ESCO LMS manufacturer partner will work with the City to define the network protocol for all sections (e.g. NLC to gateway, gateway to Central Management System) of the backhaul network.
 - The ESCO LMS manufacturer partner should conduct a propagation study to define the required gateway locations (if required) and quantities. The study should provide options that compare the quantity of gateways to LMS performance. The ESCO and City shall collaborate on identifying final gateway locations and mounting points.
 - If required or requested for specific network configurations, the ESCO must engage a partner to design/specify a NMS with an integration and support plan.
 - The ESCO LMS manufacturer partner shall collaborate with the City to define lighting groups and lighting schedules.
 - The ESCO should confirm total pricing for the resulting LMS design using previously confirmed RFP unit pricing or from the RFP or the later (if better) Product Evaluation and Selection Process.
 - The ESCO shall provide LMS forecasts of LMS data usage by device to support the City in planning for the appropriate data plans (e.g. cellular) and costs.
- Phase 2 – LMS Installation
 - The ESCO installation partner shall install and commission all network gateways and collaborate with the ESCO LMS manufacturer partner to confirm operation. If specified, a NMS must be installed and commissioned in close coordination of City IT staff.
 - The ESCO installation partner shall install NLCs at the time of LED luminaire conversion.
- Phase 3 – LMS Commissioning
 - The ESCO LMS manufacturer partner shall complete initial commissioning of newly installed NLCs on a daily basis. Initial commissioning will include, but not be limited to:
 - NLC assignment to a gateway with confirmed communication.
 - NLC's assignment to user-defined groups.
 - NLC programming for individual NLCs or groups of NLC's to operate based on user-defined lighting schedules.

- The City will specify an initial dimming level for all luminaires that allows for quick daily commissioning and is within 10% of the final specified dimming levels completed during final LMS commissioning.
 - The ESCO LMS manufacturer partner should confirm that all luminaires and NLC's installed on a given day are commissioned on the same day. Any NLC's installed but not communicating or visible by the LMS, must be tracked and researched by the ESCO install partner.
- As defined in the ESCO project management requirements and bi-weekly project status meetings, the ESCO shall report LMS installation progress.
- At regular intervals (e.g. quarterly) the ESCO LMS manufacturer partner shall dim luminaires to final dimming levels based on defined dimming groups and schedules.
- A final commission of the LMS will be required that includes confirmation of all the above on-going commissioning process and final LMS commissioning as defined by the ESCO LMS manufacturer partner and the City.
- Phase 4 – LMS Training and Support
 - The ESCO LMS manufacturer partner shall provide training for all City identified and authorized users.
 - The ESCO LMS manufacturer partner shall provide on-going support during the license term.

6.4 LMS Support of Smart City Overview & Adaptive Lighting

The City is looking for the LMS components and network to support Smart City applications. While the addition and integration of Smart City applications may occur over time, any proposed LMS solution must have the capability of supporting those functions.

The City expects any proposed LMS solution to have a modular expansion capability to support Smart City applications. The City expects the network supporting any LMS will have the bandwidth at time of initial installation to support the data requirements of currently specified and future Smart City applications. The City understands that Smart City applications will require the purchase of additional information/data capture hardware devices (e.g. video cameras, sensors) and also possibly Smart City input hub/processor modules. The City also understands that additional annual costs may be incurred with the addition of Smart City capabilities.

When submitting product and pricing information for any Smart City applications, RFP respondents should indicate where 3rd party products or services are required and reflect that price in their RFP submittal. All costs, both up-front and annual, must be reflected in the RFP submittal.

6.5 LMS Support of Smart City Applications

The City is interested in possibly adding the following Smart City applications during the LED lighting upgrade project or at a later date:

- Sensor or Camera Applications
 - Road Temperature Sensing
 - Flood Monitoring
 - Parking Availability (at-grade or in-ground sensors)
 - Vehicular Speed Identification
 - Air Quality Measurement
- Microphone (Audio Sensor) Applications
 - Gun-Shot Detection
 - Nuisance Noise Measurement
- Camera Applications
 - Real-Time Security Monitoring (High Definition Streaming)
 - Stored/Retrieval Security Monitoring (Medium Definition Capture)
 - Parking Availability
 - Traffic Volume Counting
 - Pedestrian Volume Counting
 - Bicycle Volume Counting
 - License Plate Reading
- Other Applications
 - Public Wi-Fi
 - 5G Small Cell
 - Digital Signage
 - Accessory Power Monitoring (e.g. pole-mounted holiday lights)

6.6 LMS Adaptive Lighting

- The above Smart City applications typically serve a unique purpose not associated with lighting control. With the addition of Smart City sensors, cameras and microphones the LMS has the opportunity analyze information captured by those devices to inform changes to specific groups of luminaires or the entire lighting system. Changing lighting operations based on device inputs is considered adaptive lighting. Any proposed LMS must be able to perform the following example types adaptive lighting strategies:
 - Increase or decrease illumination levels based on traffic volume, pedestrian volumes or movement (occupancy) detection.
 - Increase luminaires to full light output based on gun-shot detection or a 911 signal.
 - Increase illumination levels based on unsafe road conditions.

7.0 RFP Submittals for ESCO Product and Service Solutions

7.1 Proposer Characteristics and Project Approach

- ESCO Team Profile
 - In this section the ESCO will enter information about ESCO and Partner team members:
 - ESCO Information
 - Company Name
 - Parent Company Name
 - Federal EIN
 - Year Company Established
 - Company Location (City, State)
 - Primary Contact Name
 - Primary Contact Title
 - Primary Contact Email
 - Primary Contact Cell #
 - Years of Employment with Current Company
 - Years of Relevant Industry Experience
 - Relevant Reference Projects (project names only)
 - Audit/GIS Partner Information
 - Parent Company Name
 - Federal EIN
 - Year Company Established
 - Company Location (City, State)
 - Primary Contact Name
 - Primary Contact Title
 - Primary Contact Email
 - Primary Contact Cell #
 - Years of Employment with Current Company
 - Years of Relevant Industry Experience
 - Relevant Reference Projects (project names only)
 - Previous projects with ESCO (project names only)
 - Design Partner Information
 - Company Name
 - Parent Company Name
 - Federal EIN
 - Year Company Established
 - Company Location (City, State)
 - Primary Contact Name
 - Primary Contact Title
 - Primary Contact Email
 - Primary Contact Cell #
 - Years of Employment with Current Company
 - Years of Relevant Industry Experience
 - Relevant Reference Projects (project names only)
 - Previous projects with ESCO (project names only)
 - Community Outreach Partner
 - Company Name
 - Parent Company Name

- Federal EIN
- Year Company Established
- Company Location (City, State)
- Primary Contact Name
- Primary Contact Title
- Primary Contact Email
- Primary Contact Cell #
- WMBE Status
- Years of Employment with Current Company
- Years of Relevant Industry Experience
- Relevant Reference Projects (project names only)
- Previous projects with ESCO (project names only)
- Distribution (Preferred) Partner Information
 - Company Name
 - Parent Company Name
 - Federal EIN
 - Year Company Established
 - Company Location (City, State)
 - Primary Contact Name
 - Primary Contact Title
 - Primary Contact Email
 - Primary Contact Cell #
 - Material Markup %
 - WMBE Status
 - Years of Employment with Current Company
 - Years of Relevant Industry Experience
 - Relevant Reference Projects (project names only)
 - Previous projects with ESCO (project names only)
- Install (Preferred) Partner Information
 - Company Name
 - Parent Company Name
 - Federal EIN
 - Year Company Established
 - Company Location (City, State)
 - Primary Contact Name
 - Primary Contact Title
 - Primary Contact Email
 - Primary Contact Cell #
 - Product and Labor Warranty Term
 - WMBE Status
 - Years of Employment with Current Company
 - Years of Relevant Industry Experience
 - Relevant Reference Projects (project names only)
 - Previous projects with ESCO (project names only)
- ESCO Team Organizational Chart
 - In this section the ESCO will cut and paste a legible image of their Team Organizational Chart.

- The Organizational Chart should represent all the key ESCO Team members including all sub-contractor partners.
- ESCO Team Resumes
 - It is requested that the ESCO provide a single pdf document with all key ESCO Team Member resumes.
 - Resumes should include relevant experience, qualifications and educational background demonstrating, with narrative and references, that team members and personnel have satisfactorily performed similar work in the past.
- ESCO Financial Capabilities
 - In this section the ESCO will respond to specific questions intended to determine the financial capacity to manage all elements of the required work.
 - This will be evaluated based on requests for audited financials, credit rating and outstanding claims.
 - The ESCO must be able to meet the terms of the Pennsylvania Guaranteed Energy Savings Act (GESA) mitigate risk on the project performance through performance bonds, parent guarantees, or other means.
 - Provide a narrative that demonstrates the financial capacity to manage all elements of the required work. Please submit separately a copy of the company's (or parent company/guarantor) audited financials for the last two (2) years.
 - Disclose your credit rating and the providing agency #1
 - Disclose your credit rating and the providing agency #2
 - Disclose your credit rating and the providing agency #3
 - Disclose any work for another entity which may impair the ability to perform the scope and responsibilities under this RFP. Disclose any outstanding claims or other matters which may impair the ability to perform, whether financial or otherwise.
 - Describe your firm's ability to meet the terms of the Pennsylvania Guaranteed Energy Savings Act (GESA) to mitigate risk on the project performance through performance bonds, parent guarantees, or other means. At a minimum, GESA requires that a written guarantee be provided that project savings will meet or exceed the cost of energy conservation measures and that ESCOs provide a sufficient bond for performance. Guarantees that are above the minimum requirement during the performance of the project provide additional value for the Administrator.
 - Describe your firm's ability to provide or arrange financing for this project. Describe the structure of the financing arrangement including projected interest rate, financing term, repayment schedule, equipment ownership, security interest required, the responsibilities/liabilities of each party, and any special terms and conditions that may be associated with the financing of this project. Describe how construction could be financed. Include your firm's bonding references including company name, address, contact person, telephone number and information on your firm's maximum bonding capability. Note that the Administrator is exploring a variety of funding options and this information may not be used.
- ESCO Reference Projects
 - In this section the ESCO is asked to provide information on five (5) lighting upgrade projects. The City is most interested in other streetlighting upgrade projects that are similar in scope and scale to its project. For each reference project, provide:

- Project Name
 - Project Location (City, State)
 - City/Municipality Client Name
 - Project Summary (200 word limit)
 - Project Budget
 - Projected Guaranteed Annual Energy Savings and Operational Savings (if applicable)
 - Project Start Date
 - Project Duration (months)
 - ESCO Project Lead Name and Title
 - Other ESCO Team Members and Titles (limit to those planned to support the City project)
 - Audit/GIS Partner Company Name
 - Design Partner Company Name
 - Community Outreach Partner Company Name
 - Installer Partner Company Name
 - Total Cobrahead Luminaire Quantity Installed
 - Total Decorative Luminaire Quantity Installed
 - Other Luminaire Types Installed (list all with quantity)
 - Total Quantity of Network Control Nodes Installed
 - Smart City Functions Implemented (list all)
 - Client Reference - Name
 - Client Reference - Title
 - Client Reference - Email
 - Client Reference - Phone
- Partner Reference Projects
 - In this section the ESCO is asked to provide information on three (3) reference projects each for their Design, Audit/GIS and Installer Partner (a total of nine (9) projects). Indicate whether multiple identified partners participated in any of the reference projects. The City is most interested in other streetlighting upgrade projects that are similar in scope and scale to its project. For each reference project, provide:
 - Partner Company Name
 - Project Name
 - Project Location (City, State)
 - City/Municipality Client Name
 - Project Summary (200 word limit)
 - Project Budget
 - Projected Annual Energy Savings and Operational Savings (if applicable)
 - Project Start Date
 - Project Duration (months)
 - Partner Project Lead Name and Title
 - Total Cobrahead Luminaire Quantity Designed
 - Total Decorative Luminaire Quantity Designed
 - Other Luminaire Types Installed (list all with quantity)
 - Total Quantity of Network Control Nodes Designed
 - Smart City Functions Designed (list all)
 - Client Reference - Name
 - Client Reference - Title
 - Client Reference - Email
 - Client Reference - Phone

- ESCO General Responses
 - In this section the ESCO will respond to specific questions intended to identify unique value-added approaches used to meet the service requirements defined in this RFP.
 - The City requests that the responses include specific details that are relevant to successfully implementing solutions that will bring success to this project.
 - Where informative, provide relevant team member and project references. Your response should be consistent with the project timeline submittal provided. When explaining your specific approach to meeting requirements of specific RFP sections, if you feel that specific activities or deliverables are missing from the RFP section, provide proposed additions and indicate the value of those suggestions.
 - Each of the following questions should be answered in 1000 words or less. The City reserves the right to not consider the portion of responses that exceed the requested word limits.
 - Describe the overall approach to managing all the phases of the project as defined in Section 2.0 (Overview of Project Development and Implementation Phases).
 - Explain your specific approach to meeting the ESCO requirements for Field Audit defined in Section 3.1.3 (Project Development - Field Audit).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.1.4 (Project Development - Preliminary Design).
 - Explain your proposed solutions to ensuring sidewalk (backlighting) photometric illumination requirements are achieved.
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.1.5 (Project Development - Final Product Evaluation/Selection).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.1.6 (Project Development - Community Outreach/Trial Installation).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.1.7 (Project Development - Final Design).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.2.1 (Implementation - Procurement/Pre-Construction).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.2.2 (Implementation - Construction & Project Management).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.2.3 (Implementation - Project Close-Out).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.2.4 (Implementation - PECO Bill Updates & Rebate Management).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.2.5 (Implementation - Project Documentation).
 - Explain your specific approach to meeting the ESCO requirements defined in Section 3.3.1 (Measurement and Verification - M&V Services, Analysis & Reporting).
 - Define the most cost-effective M&V scope of work that meets the minimum requirements defined for a PA GESA project. Identify common M&V services or deliverables that are not required for the unique needs of an LED streetlighting conversion project.
 - Highlight key strengths of your ESCO Team and specific differentiators to other market providers of lighting upgrade services.

- Identify any technical specifications that should be added to, deleted from or modified in Section 5.0 (Luminaire Specifications). Please provide rationale for recommendations.
- Identify any technical specifications that should be added to, deleted from or modified in Section 6.2 (LMS Specifications). Please provide rationale for recommendations.
- Explain your specific approach to meeting the ESCO requirements defined in Section 6.3 (LMS Implementation Requirements).
- Identify any Smart City Applications that should be added to, deleted from or modified in Section 6.5 (Support of Smart City Applications). Provide rationale for recommendations. Explain ESCO experience with implementing Smart City functions. Be specific with relevant information on project name, types of Smart City applications implemented and quantities of luminaires impacted for each Smart City application type.
- Describe any project experience the ESCO has with implementation of Adaptive Lighting Strategies as discussed in Section 6.6 (LMS Adaptive Lighting). Be specific with relevant information on project name, types of Adaptive Lighting applications implemented and quantities of luminaires impacted for each Adaptive Lighting type.

7.2 RFP Submittal Worksheet (Attachment A.1)

The ESCO will be required to submit responses through the RFP Submittal Worksheet (Attachment A.1). The following describes their different sections (tabs) of the RFP Submittal Worksheet (Attachment A.1) and response expectations.

- **Instructions**
 - This section defines general instructions for completing the RFP Submittal Worksheet (Attachment A.1).
 - The worksheet is mostly protected from user input except where an ESCO is to provide a response. Cells that require an ESCO response are filled in a light tan color. In some cases, these cells are left blank awaiting the ESCO to enter their response, while in other cases an italicized prompt is provided to direct the appropriate response (e.g. Yes or No, \$x.xx, enter name). When an italicized prompt is provided the ESCO should overwrite that text with their response.
- **Luminaire Solutions & Pricing**
 - This section combines City requirements and specifications for typical applications, ESCO proposed technical solutions and associated product and service pricing.
 - ESCO proposed solutions provided in this RFP will be considered a “committed” basis of design. If the City chooses to accept a solution offered in the RFP response, it would expect all technical/performance specifications and pricing to be maintained or improved for use throughout the entire term of the project defined by this RFP. The selected ESCO partner will also be expected to

complete a transparent Product Evaluation and Selection Process (discussed in a previous section) that will identify additional qualified manufacturer solutions.

- All solutions provided in this section must be accompanied by fully populated Manufacturer Data/Cut-Sheets and submitted with the Proposal.
- All solutions provided in this section must be accompanied with IES LM-63 format photometric data files submitted with the Proposal.
- All solutions provided in this section must be accompanied with a TM-21 calculator (worksheet format) submitted with the Proposal.
- All solutions provided in this section must be accompanied with an ISTMT data sheet, if available, submitted with the Proposal.

- LMS Solutions & Pricing

- This section defines the requirements for LMS solution submittals. It should be noted that all solutions submitted by the RFP respondent and the corresponding technical/performance specifications and pricing, will be considered a “committed” basis of design. If the City chooses to accept a solution offered in the RFP response, it would expect all technical/performance specifications and pricing to be maintained or improved for use throughout the entire term of the project defined by this RFP. The selected ESCO partner will also be expected to complete a transparent Product Evaluation and Selection Process (discussed in a previous section) that will identify additional qualified manufacturer solutions.
- ESCOs must provide solutions for Options #'s 1, 2 and 3. Additional columns are offered for up to 3 other LMS solutions (#4, 5 and 6) that are different from the required Options 1-3. There is not a requirement to submit additional solutions beyond Options 1-3.
- General documentation shall be provided that explains the overall LMS system architecture for ESCO solutions provided with this RFP.
- All LMS components proposed in this section must be accompanied by fully populated Manufacturer Data/Cut-Sheets and submitted with the Proposal.
- LMS annual license fees must include all costs not included/embedded in control hard costs (materials and labor), including but not limited to:
 - LMS up-front Set-Up, Commissioning and Training
 - LMS technical support for all years of the license term
 - LMS warranty support for all years of the warranty term
 - LMS system version and patch updates for all years of the license term
 - Cellular communication costs should NOT be included in annual license fees as they are a direct cost to the City and are identified separately in the submittal worksheet.

- ESCO Service Fees

- In this section the ESCO will provide unit prices that cover all of the costs associated with delivering the required solutions and services for this project. Pricing must be submitted for each service category line item with each project phase.
- ESCO costs must include all partner/sub-contractor direct and related costs
- Any additional ESCO costs that are not covered by the listed service categories must be added to one of these categories.
- ESCO should embed all internal contingency, overhead and profit in the service category line item unit pricing
- ESCO is committing to unit pricing, if quantities change then total fees would change. Quantities for each service line item above could be different (e.g. all luminaires audited,

but fewer luminaires designed or upgraded).

- Total Project Budget
 - In this section total costs from other sections (tabs) are carried over to show the total project budget. There is no submittal requirement in this section.
- Project Phases & Timeline
 - In this section the ESCO is expected to populate the project timeline to show how it plans on meeting the City's overall project timing requirements. Cells should be filled in with bright green fill to show the duration of each project phase and service category.
 - The ESCO may elect to copy and paste a copy of the timeline as a gantt chart generated by a project management tool and include it in the narrative described in Section 7.1.

7.3 Typical Application Photometric Analysis

- ESCO should submit photometric analysis documents with the RFP response. The ESCO should submit one document for each of the (8) Typical Applications for Dusk-to-Dawn and Cobrahead style luminaires (row 3, columns C-J, not including decorative applications) defined in the Luminaire Solutions & Pricing tab of the RFP Submittal Worksheet (Attachment A.1). The photometric analysis should be conducted with an industry standard application, such as AGI32. Each photometric analysis should utilize the Roadway Data and Photometric Assumptions sections (rows 7-37) provided under each Typical. The luminaire solutions proposed by the ESCO for each Typical Application should be used in the photometric analysis. Attachment A.2 defines all the requirements, assumptions and specifications to be utilized in the photometric analysis.

7.4 Initial Feasibility Assessment

- Based on existing available data and assumptions about 1-for-1 replacements of existing luminaires using the RFP recommended solutions and partners, ESCO should create and present an **Initial Feasibility Assessment** estimating annual savings and project costs. The ESCO shall use solution and associated pricing information from RFP Submittal Worksheet (Attachment A.1). The Initial Feasibility Assessment shall include all the same content defined in the Preliminary Design Report described in section 3.1.4 above.
- Assumptions to be used in the Initial Feasibility Assessment should be based on the ESCO solution specifications and pricing provided in the RFP Submittal Worksheet. Additional assumptions, include:
 - Existing Luminaire Wattages
 - Use existing wattages provided in the Luminaire Solutions and Pricing Tab of the RFP Submittal worksheet (row 9)
 - Utilize Control Option #1 from the LMS Solutions and Pricing Tab of the RFP Submittal worksheet (column B) with no Smart City functions or costs
 - Include ESCO Service Fees from the ESCO Service Fees Tab of the RFP Submittal worksheet (cell B21); add to luminaire hard costs for each Typical Application
 - Annual Operating Hours for all Typical Applications = 4,092
 - Energy Consumption Rate:

- \$.032/kWh for Alley and Driveway Typical Applications
 - \$.041/kWh for all other Typical Application Types (Cobrahead and Decorative)
 - Annual Energy Escalation Rate = 1.5%
- Service Location Distribution Charge
 - \$2.19353/Service Location for Alley and Driveway Typical Applications
 - \$6.94941/Service Location for all other Typical Application Types (Cobrahead and Decorative)
 - Assume Service Location quantities = luminaire quantities
 - No assumed escalation rate
- Energy analysis should show breakdown of savings associated with both the SL-E tariff and separately the additional savings transitioning to the SL-C tariff (not including Alley and Driveway Typical Applications)
- Maintenance Savings are not to be included in the Initial Feasibility Assessment
- PECO Rebates based on current program
- Financing Terms
 - 20-Year Term
 - 2% Interest Rate

7.5 Attachments

The following attachments are referenced in this section and provided separately as part of the RFP package:

- Attachment A.1 – RFP Submittal Worksheet
- Attachment A.2 – Typical Application Photometric Layout Samples
- Attachment A.3 – City IT Standards
- Attachment A.4 – Current Decorative LED Luminaire Specification Sheets
- Attachmetn A.5 – Lighting System Database (SDDB) Attributes