

**LINKING AGREEMENT
BETWEEN
THE CITY OF GLENDALE, ARIZONA
AND
AMERESCO, INC.**

THIS LINKING AGREEMENT (this "Agreement") is entered into as of this _____ day of _____, 2017, between the City of Glendale, an Arizona municipal corporation (the "City"), and Ameresco, Inc., a Massachusetts corporation authorized to do business in Arizona ("Contractor"), collectively, the "Parties."

RECITALS

- A. On March 16, 2017, under the S.A.V.E. Cooperative Purchasing Agreement, the City of Phoenix entered into a contract with Contractor to purchase the goods and services described in the Energy Saving Street Light Conversion Project ("Cooperative Purchasing Agreement"), which is attached hereto as Exhibit A. The Cooperative Purchasing Agreement permits its cooperative use by other governmental agencies including the City.
- B. Section 2-149 of the City's Procurement Code permits the Materials Manager to procure goods and services by participating with other governmental units in cooperative purchasing agreements when the best interests of the City would be served.
- C. Section 2-149 also provides that the Materials Manager may enter into such cooperative agreements without meeting the formal or informal solicitation and bid requirements of Glendale City Code Sections 2-145 and 2-146.
- D. The City desires to contract with Contractor for supplies or services identical, or nearly identical, to the supplies or services Contractor is providing other units of government under the Cooperative Purchasing Agreement. Contractor consents to the City's utilization of the Cooperative Purchasing Agreement as the basis of this Agreement, and Contractor desires to enter into this Agreement to provide the supplies and services set forth in this Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated by reference, and the covenants and promises contained in this Linking Agreement, the parties agree as follows:

1. **Term of Agreement.** The City is purchasing supplies and/or services from Contractor pursuant to the Cooperative Purchasing Agreement. According to the Cooperative Purchasing Agreement, purchases can be made by governmental entities from the date of award, which was March 16, 2017, until the date the contract expires on February 14, 2020, unless the term of the Cooperative Purchasing Agreement is extended by the mutual agreement of the original contracting parties. The Cooperative Purchasing Agreement, however, may not be extended beyond February 14, 2020. The initial period of this Agreement, therefore, is the period from the Effective Date of this Agreement until February 14, 2020. Renewals are not automatic and shall only occur if the City gives the Contractor

notice of its intent to renew. The City may give the Contractor notice of its intent to renew this Agreement 30 days prior to the anniversary of the Effective Date to effectuate such renewal.

2. Scope of Work; Terms, Conditions, and Specifications.

- A. Contractor shall provide City the supplies and/or services identified in the Scope of Work attached as Exhibit B.
- B. Contractor agrees to comply with all the terms, conditions and specifications of the Cooperative Purchasing Agreement. Such terms, conditions and specifications are specifically incorporated into and are an enforceable part of this Agreement.

3. Compensation.

- A. City shall pay Contractor compensation at the same rate and on the same schedule as provided in the Cooperative Purchasing Agreement, which is attached hereto as Exhibit C.
- B. The total purchase price for the supplies and/or services purchased under this Agreement shall not exceed four million, seven hundred seventeen thousand, five hundred forty-seven dollars (\$4,717,547) for the entire term of the Agreement (initial term plus any renewals).

4. Cancellation. This Agreement may be cancelled pursuant to A.R.S. § 38-511.

5. Non-discrimination. Contractor must not discriminate against any employee or applicant for employment on the basis of race, color, religion, sex, national origin, age, marital status, sexual orientation, gender identity or expression, genetic characteristics, familial status, U.S. military veteran status or any disability. Contractor will require any Sub-contractor to be bound to the same requirements as stated within this section. Contractor, and on behalf of any subcontractors, warrants compliance with this section.

6. Insurance Certificate. A certificate of insurance applying to this Agreement must be provided to the City prior to the Effective Date.

7. E-verify. Contractor complies with A.R.S. § 23-214 and agrees to comply with the requirements of A.R.S. § 41-4401.

8. No Boycott of Israel. The Parties agree that they are not currently engaged in, and agree that for the duration of the Agreement they will not engage in, a boycott of Israel, as that term is defined in A.R.S. §35-393.

9. Attestation of PCI Compliance. When applicable, the Contractor will provide the City annually with a Payment Card Industry Data Security Standard (PCI DSS) attestation of compliance certificate signed by an officer of Contractor with oversight responsibility.

10. Notices. Any notices that must be provided under this Agreement shall be sent to the Parties' respective authorized representatives at the address listed below:

City of Glendale
c/o Michael Sills-Trausch
5850 West Glendale Avenue #315
Glendale, Arizona 85301
623-930-2019

and

Ameresco, Inc.
c/o Leonard Byrd
60 East Rio Salado Blvd. #1001
Tempe, AZ 85281
520-490-3663

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date and year set forth above.

"City"

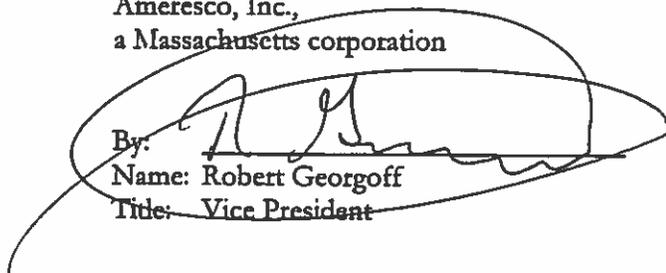
City of Glendale, an Arizona
municipal corporation

By: _____

Kevin R. Phelps
City Manager

"Contractor"

Ameresco, Inc.,
a Massachusetts corporation

By: 

Name: Robert Georgoff
Title: Vice President

ATTEST:

Julie K. Bower (SEAL)
City Clerk

APPROVED AS TO FORM:

Michael D. Bailey
City Attorney

**LINKING AGREEMENT
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EXHIBIT A
ENERGY SAVING STREET LIGHT CONVERSION PROJECT CONTRACT 144691-1



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CITY OF PHOENIX
Street Transportation Dept
200 W. Washington St., 5th Floor
Phoenix, Arizona 85003
Phone: (602) 262-6682

Date March 16, 2017
Solicitation No. RFP 63-0022. **144691--1**
SRM/SAP Contract No. 4701004322
City Clerk Contract No.
Amendment No. Amendment No. 1

Contract Title Energy Saving Street Light Conversion Project
Contractor Name Ameresco, Inc.
Contractor E-mail Daniel Hunter <dhunter@ameresco.com>

Buyer Name Melodie Mendivil
Telephone No. (602) 262-6682
Buyer Email melodie.mendivil@phoenix.gov

THE ABOVE REFERENCED CONTRACT IS AMENDED AS FOLLOWS:

1. Any references to:

Charlene Reynolds
Street Transportation Deputy Director
charlene.reynolds@phoenix.gov
(602) 262-6450

are hereby replaced with:

Bruce Littleton
Street Transportation Traffic Engineering Supervisor
bruce.littleton@phoenix.gov
(602) 262-4690

2. Ameresco's proposal is part of the contract, but for ease of reference and clarification of the Scope of Work, the proposal is modified as follows:

Remove

Section A. Proposer's Experience and Qualifications (in its entirety)

Modify

Section B. Method of Approach, Section D. Price Proposal, and Appendices –
Remove all references to all Kelvin rating other than the 2700° K that was approved by City Council.



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3. As a result of procurement RFP 63-0022, the City Council approved the Energy Service Contract (ESCO) model, now known as Enhanced Capital purchase, therefore deleting Sections X, XI, and XII [pages 64-109], and replacing with Exhibit A. "Scope of Work."
4. The attachments to the RFP are not included in the final contract, except for RFP Attachment A (Price Proposal template), but will be available in the City's Procurement File as reference materials.
5. Ameresco's Price Proposal for 2700 K fixtures is included, but Ameresco's Price Proposals for other Kelvin temperatures not approved by the City are deleted.
6. Section VIII.A, "Standard Terms and Conditions, Definitions" is revised to add "OR "CONSULTANT"" to the definition of "Contractor" as those terms are used interchangeably in the document and in this Amendment.
7. Section VIII.G "Standard Terms and Conditions, Warranties," Subsection 1 Quality and Subsection 2 Responsibility for Correction are deleted and replaced with Exhibit A "Scope of Work."
8. Section VIII.G, "Standard Terms and Conditions, Warranties," Subsection 3 Liens is amended to "Contractor shall hold the City harmless from claimants supplying labor or materials to the Contractor or its subcontractors in the performance of the work required under this contract PROVIDED THE CITY IS NOT IN BREACH OF ITS PAYMENT OBLIGATIONS HEREUNDER."
9. Section VIII.G "Standard Terms and Conditions, Warranties," Subsection 4 Professional Responsibility is deleted.
10. Section VII.B "Special Terms and Conditions, Method of Payment" [on page 27] of the RFP, Section VIII.D "Standard Terms and Conditions, Costs and Payments" [pages 48-49] paragraphs 1 & 4 only, are deleted and replaced with Exhibit B. "Payment, Acceptance of Work and Fee Schedule"
11. Section VIII.I "Standard Terms and Conditions, Contract Termination" Subsection 2 Conditions and Causes for Termination is hereby amended to read as follows:

This Contract may be terminated at any time by mutual written consent, or by the City, with or without cause, upon giving thirty (30) days written notice to Contractor. The City at its convenience, by written notice, may terminate this Contract, in whole or in part. If this Contract is terminated, the City shall be liable only for payment under the payment provisions of this Contract for



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services rendered and accepted material received by the City before the effective date of termination. Title to all materials, work-in-process and completed but undeliverable goods, will pass to the City after costs are claimed and allowed. The Contractor shall submit detailed cost claims in **A FORM REASONABLY ACCEPTABLE TO THE CITY** and shall permit the City to examine such books and records as may be necessary in order to verify the reasonableness of any claims.

The City reserves the right to cancel the whole or any part of this Contract due to failure of Contractor to carry out any term, promise, or condition of the Contract. The City will issue a written notice of default to Contractor for acting or failing to act as in any of the following:

In the opinion of the City, Contractor provides personnel who do not meet the requirements of the Contract;

In the opinion of the City, Contractor fails to perform adequately the stipulations, conditions or services/specifications required in this Contract;

In the opinion of the City, Contractor attempts to impose on the City personnel or materials, products or workmanship, which is of an unacceptable quality;

Contractor fails to furnish the required service and/or product within the time stipulated in the Contract;

In the opinion of the City, Contractor fails to make progress in the performance of the requirements of the Contract and/or give the City a positive indication that Contractor will not or cannot perform to the requirements of the Contract.

THE CONTRACTOR WILL HAVE SEVEN (7) CALENDAR DAYS, PLUS SUCH ADDITIONAL TIME AS MAY BE SPECIFICALLY JUSTIFIED UNDER THE CIRCUMSTANCES, FOLLOWING RECEIPT OF ANY WRITTEN NOTICE OF DEFAULT OR CANCELLATION UNDER THIS AGREEMENT TO CURE ANY BREACH BEFORE THE CITY WILL HAVE THE RIGHT TO TERMINATE THIS AGREEMENT.



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EXHIBIT A
SCOPE OF WORK

Consultant will provide the City with labor, materials, supplies, equipment, facilities, disposal, photometric analyses, digital reports, and processing for all utility rebates and rate schedules associated with the conversion program. This program will replace mostly high pressure sodium (HPS), cobra head and shoebox style street light fixtures to 2700° K Light Emitting Diode (LED) to the City.

The work to be done consists of furnishing and installing new LED energy efficient lighting fixtures, removal and disposal/recycling of existing HPS lighting fixtures and maintaining existing electrical systems working during construction. No used, refurbished, reconditioned, or rebuilt parts or products shall be used, unless otherwise approved by the City in writing; all new LED street lights shall be fully operational each night unless documented.

The services to be provided hereunder will be performed in two phases: The Audit and Development phase and the Project Implementation phase. These phases are described in more detail below. Consultant will be deemed to have satisfactorily completed the Scope of Work with respect to the Audit and Development phase (the "Deliverable 1 Work") upon delivery to the City of the deliverables required under the heading Deliverable 1. With respect to the Project Implementation phase, Consultant will be deemed to have satisfactorily completed the Scope of Work with respect to the Project Implementation phase (the "Deliverable 2 Work") upon delivery to the City of the deliverables required under the heading Deliverable 2.

Deliverable 1 – Audit and Project Development:

Upon issuance of a Notice to Proceed with respect to the Deliverable 1 Work, the Contractor will complete all of the following:

- 1.1 Conduct detailed investigation of Arizona Public Service (APS) and Salt River Project (SRP) billing records and Geographic Information Systems (GIS) maps to establish ownership and eligibility for replacement.
- 1.2 Develop and submit required paperwork to reconcile street light billing records and confirm rebate eligibility.
- 1.3 Perform a site survey of all existing fixtures and record the data in a central GIS database that can be accessed over the internet. The final dataset will include the existing fixture model, type, wattage, controls, roadway classifications (arterial, collector, and local), pole spacing, and other characteristics for each streetlight fixture and pole locations as well as a unique pole identifier number.
- 1.4 Once the streetlight audit is complete, Consultant will team with the City to conduct a thorough in-depth "Roadway – Pole Spacing Analysis" to evaluate and field measure agreed upon site samples throughout the City to determine the optimal lighting applications and fixture selections for the City.



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- 1.5 The consultant shall identify any locations of concern from the street light audit, which may require additional work by the City that is not covered by this agreement, to achieve optimal lighting.
- 1.6 Perform a photometric analysis of each identified roadway configuration to determine the most appropriate LED replacement fixture to approximate the IES RP-8-14 recommended practice.
- 1.7 Upload the agreed upon streetlight information for each streetlight point on the GIS map. Provide the ability to click on any one streetlight point on the GIS map to open a drop down box for convenient access to data.
- 1.8 Update the fixture type, wattage and install date throughout project implementation. The Consultant's installation crews will use the GIS audit tools to keep information updated.
- 1.9 Consultant to implement a pilot project, utilizing the selected 2700° K fixtures in pilot area(s) designated by the City and agreed to by the Consultant. Number of fixtures utilized in the pilot project shall not exceed 1,113 fixtures. Consultant will provide before and after field measurements (light level on pavement) in accordance with Illuminating Engineering Society (IES) publication LM-50-13 Photometric Measurement of Roadway and Street Lighting Installations.
- 1.10 During the pilot installation period, the Consultant shall work with the City to recover all existing fixtures that are removed from the field to ensure that the City and its Job Order Contract (JOC) maintenance contractors have sufficient stock to keep the existing lighting system working during the construction period. These removed fixtures shall be returned to the City at a mutually agreed upon location.
- 1.11 Prepare detailed pricing estimate(s) representing all project options under consideration. The "base" project option will include a ten (10) Year Labor Warranty and a ten (10) Year Hardware Warranty for fixtures as described in more detail in Section 2.3 below.
- 1.12 Develop energy (kWh), Greenhouse Gas (GHG) and energy cost savings models to ensure results and cost-effectiveness of project options. Since this is not an energy savings performance contract, the utility rates used to calculate energy cost savings will be those specified in Attachment A of the RFP 63-0022, LED Cost Proposal Template.
- 1.13 Discuss and confirm recommendations with the City to finalize project details and render the final Scope of Work for Project Implementation.
- 1.14 Determine the Consultant's Scope of Work for Community Outreach for consideration and approval as part of the Deliverable 2 – Project Implementation. Community Outreach plan is intended to ensure project awareness and minimize traffic impact and may include the following:
 - Fliers, mailers, emails, HOA notifications
 - Maintain website that contains Frequently Asked Questions (FAQs) and real-time project schedules
 - Provide number and man phone for citizen questions and complaints

Deliverable 2 – Project Implementation:



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Upon issuance of the Notice to Proceed with respect to the Deliverable 2 Work:

- 2.1 Consultant will meet with the City to conduct final review of all energy savings and construction cost estimates to ensure accuracy and compliance.
- 2.2 Consultant and the City will conduct final review of the LED street light fixture and photoelectric cell (PEC) specifications so that equipment selections can be finalized.
- 2.3 Consultant will prepare a complete specification package and submit to the City for review and approval.
- 2.4 Consultant will only initiate the Procurement process for Deliverable 2 Work after receipt of the Notice to Proceed.
- 2.5 Consultant shall purchase qualified 2700° K luminaires from the authorized fixture manufacturer.

3 Warranty.

- 3.1 Consultant warrants to the City that all light luminaires and parts thereof, including, without limitation, photocells (collectively, "Equipment"), shall be new and of good quality and free from defects in materials and workmanship under normal operating conditions;
- 3.2 Consultant warrants to the City that the Work will be performed in a good and workmanlike manner, will be free from defects in workmanship, and will conform to the Scope of Work; and the Work will contain the Equipment, supplies and materials described in the Scope of Work;

Provided, that during the Warranty Period (as hereinafter defined) Consultant's warranties with respect to Equipment shall be limited to the corresponding warranties made by the suppliers and manufacturers of such Equipment; and further provided, that Consultant's warranties in Section 2.3.1 and 2.3.2 expressly exclude defects caused by the City's failure to comply with the manufacturers' guidelines applicable to the Equipment and other exclusions set forth in Section 2.4.2.

- 3.3 System Warranty Period. Consultant warrants that it shall remedy, in accordance with Section 2.4, any defects or breaches of Warranty, which appear prior to the date that is ten (10) years from the Final Completion Date with respect to the Work (the "Warranty Period").

3.4 Repair of Nonconforming Work.

- 3.4.1 If the City discovers a breach of the Warranties, the City will notify Consultant in writing of such failure promptly upon discovery. If, following investigation, Consultant determines that the Work or Equipment covered under the Warranties fails to conform to the Warranties as described in such



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notice from the City, Consultant shall, at its option, either repair or replace any defective parts including re-installation, at its own expense as promptly as possible. Consultant shall pay the cost of removing any defective Equipment, shipping and installation of replacement parts and the cost of reinstalling or replacing such Equipment and shall be entitled to any monetary reimbursement from the manufacturer for same.

- 3.4.2 Consultant's Warranties herein do not cover damage, malfunction or services failures caused by: (i) the City's failure to follow manufacturer's guidelines, (ii) repair, service or modification by any party other than Consultant or a third party contracted by Consultant; (iii) abuse, neglect, misuse or negligent acts or omissions by someone other than Consultant; (iv) damage or deteriorated performance of the Equipment caused by electrical surges, lightning, fire, flood, extreme weather, pest damage, accidental breakage, actions of third parties and other causes not arising under normal operating conditions; (v) any Force Majeure Event; or (vi) normal wear and tear.
- 3.5 **Assignment of Warranties.** As of the Final Completion Date, Consultant shall assign to the City all warranties for major Equipment which are assignable. Notwithstanding the assignment, during the Warranty Period, if the City makes any warranty claim against Consultant and Consultant fulfills its obligations with respect to such claim by the City, Consultant shall be entitled to enforce for its own benefit any warranty given by such Subcontractor with respect to such Equipment and services.
- 3.6 **Limitations.** EXCEPT FOR THE WARRANTIES SET FORTH IN SECTION 2.3, THE CITY EXPRESSLY AGREES THAT CONSULTANT MAKES NO OTHER WARRANTIES OR GUARANTEES IN CONNECTION WITH THE WORK AND EQUIPMENT PROVIDED HEREUNDER, WHETHER EXPRESS OR IMPLIED, ORAL OR WRITTEN. CONSULTANT SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE CITY'S SOLE REMEDIES FOR A BREACH OF WARRANTY UNDER THIS AGREEMENT SHALL BE REPAIR OR REPLACEMENT OF THE DEFECTIVE OR NONCONFORMING WORK OR EQUIPMENT, SUBJECT TO AND IN ACCORDANCE WITH SECTIONS 2.3 AND 2.4 OF THIS AGREEMENT.
- 3.7 **Manage deliveries and staging of material to site including any secured storage considerations.**



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- 3.8 Provide Traffic Control plans based on the latest City's Traffic Barricade Manual as necessary to be reviewed and approved by the Traffic Services Division under the Street Transportation Department and obtain all required permits.
- 3.9 Participate in the implementation of community outreach and notification plan.
- 3.10 During installation, comply with all requirements to ensure replacement luminaires receive utility rebates if eligible and LED electric rate schedule
 - Accurately populate the City Street Light Conversion Worksheet
 - Ensure each newly installed luminaire has been tagged/recorded with the correct wattage sticker consistent with American National Standard for Roadway Lighting Equipment, ANSI C136.15
 - Obtain and provide accurate digital GIS data for all luminaires using Global Positioning System (GPS) technology
- 3.11 Install replacement luminaires. Provide all necessary equipment including City approved 20-year fail off photo cell, hardware, adapters, pole numbers if needed, and any other materials necessary for a quality installation. Ensure installation quality, compliance with project schedule, and proper disposal and/or recycling of old luminaires.
- 3.12 City shall meet with Consultant to review installation schedule, work safety, public safety, and waste material handling procedures and requirements.
- 3.13 Inspect final work with City and correct any outstanding punch list items or deficiencies identified by both the City and Consultant.
- 3.14 Test lights to ensure that they work and identify location where repair needs City assistance.
- 3.15 Recommend cleaning schedule to maintain lumen output.
- 3.16 Schedule and attend weekly progress meetings with City staff to discuss ongoing implementation progress and other issues arising due to the conversion program.
- 3.17 During the implementation phase, Consultant shall coordinate with the City's existing street lighting maintenance contractors.
- 3.18 The Consultant will provide documentation of a disposal and recycle plan associated with the removal and disposal of the City's existing street light assets which are replaced by the new LED light fixtures. This removal/disposal of the existing street lights shall not be a separate pay item and shall include revenue sharing for the funds of any material that is recycled.
- 3.19 During the installation period, the Consultant shall work with the City to recover existing LED fixtures that are removed from the field and provide them to the City at a mutually agreed upon location.
- 3.20 Following City acceptance, produce final project reporting documentation to the City Project Manager.
- 3.21 Provide administrative effort required to process and receive all available rebates from APS and SRP. This is a continuous process through the entire development and construction phases.
- 3.22 Provide records of all newly installed LED street lights in the form of electronic GIS records including all wattages, pole numbers, locations and other associated information.



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LED LUMINAIRE TECHNICAL SPECIFICATIONS

General Requirements:

In their RFP Response, the Consultant identified Acuity Autobahn series of LED luminaires for use on this project. If the manufacturer introduces a newer technology in the same series of LED luminaires prior to ordering the fixtures, Consultant may submit the new fixture to the City for approval at no additional cost to the City.

The luminaire shall be a fully integrated assembly. Retrofits that reuse portions of the existing fixtures will not be accepted. The luminaire shall comply with the measurement, performance and safety standards listed below.

- The entire fixture including internal components and as a whole unit shall be either Underwriters Laboratories (UL) certified, Canadian Standards Association (CSA) international certified or equivalent.
- The luminaire shall be listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) as being in compliance with UL 1598 and suitable for use in wet locations.
- The luminaire shall be in compliance with the following UL standards (latest approved):
 - 8750 LED Light Sources for Use in Lighting Products
 - 1012 Power Units other than Class 2
 - 2108 Low Voltage Lighting Systems
- The luminaire shall start and operate in an ambient temperature range of -40°C to 50°C. In-SITU Temperature Measurement Test (ISTMT) data is required for a minimum temperature range of -40°C to 40°C for the luminaires submitted in this proposal. Testing to 50°C must be submitted and approved for the luminaires prior to installation. The ISTMT laboratory must be approved by Occupational Safety and Health Administration (OSHA) as a NRTL, must be qualified, verified and recognized through the U.S. Department of Energy (DOE) CALiPER program, or must be recognized through UL's Data Acceptance Program.
- The light sources and drivers shall be Restriction of Hazardous Substances (RoHS) compliant.
- The luminaire shall have an International Electrotechnical Commission (IEC) 529 Ingress Protection (IP) rating of IP 66 or greater for the optical assemblies of the luminaire.
- The power supply shall meet or exceed Federal Communications Commission (FCC) 47 Part 15/18 to achieve consumer interference emission limits.



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- The luminaire shall be in compliance with American National Standards Institute (ANSI) C78.377.2011 – Specifications for the Chromaticity of Solid-State Lighting Products.
- The power supply shall have a minimum Class A sound rating per ANSI Standard C63.4.
- The luminaire shall be tested according to Illuminating Engineering Society of North America (IESNA) LM-79-08 - IESNA Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products.
- The luminaire shall have lumen maintenance measured in accordance with IESNA LM-80-08 – IESNA Approved Method: Measuring Lumen Maintenance of LED Lighting Sources.
- The luminaire shall have long term lumen maintenance documented according to IESNA TM-21-11 – Projecting Long Term Lumen Maintenance (LM) of LED Light Sources.
- The luminaire shall have LM-79 testing conducted by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited lab or a lab that is qualified, verified and recognized through DOE’s CALiPER program.
- The luminaire shall be classified in accordance with IESNA TM-15-07 Luminaire Classification System for Outdoor luminaires, Addendum A: Backlight, Uplight and Glare (BUG) ratings.

Luminaire Housing Requirements:

- The luminaire housing shall be constructed of cast aluminum housing with a corrosive resistant powder coat finish in gray or dark bronze. No parts shall be polycarbonate. The surface treatment shall withstand a minimum of 3,000 hours for salt and fog condition in accordance with testing performed per American Society of Testing and Materials (ASTM) Standard B117.
- All hardware on the exterior of the housing including cover and latch shall be stainless steel, zinc, or steel with zinc alloy electroplate and chromate top coat.
- A die-cast trigger latch or stainless steel tool-less screw on the door frame shall allow for tool-less entry and enable easy and secure opening with one hand.
- The door assembly shall have a safety latch to prevent the door from falling when opening.
- The luminaire shall have readily accessible internal parts.



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- The driver must be internally mounted, easily accessible, replaceable and thermally separated from the optical compartment.
- The luminaire shall mount on nominal 2 inch (2 3/8 OD) horizontal tenon.
- Two and four bolt mounting must provide 3G vibration rating per American Standards Institute and Institute of Electrical and Electronics Engineers (IEEE) C136.31.
- The mounting assembly shall permit ± 5 degrees adjustment for leveling in a minimum of 5 steps.
- The luminaire shall have an integrated bubble level.
- The luminaire housing shall have passive cooling fins integrated as part of the housing for heat dissipation (no vents, internal fans or moving parts) and be designed for water shedding and to be self-cleaning.
- The luminaire shall have field installable and manufacture installed options for house side light shields.
- The luminaire shall not weigh more than 35 pounds when fully assembled and installed.
- The luminaire shall have an effective projected area of no more than 1.2 square feet (when viewed from either side or either end).
- The luminaire shall have a 7-prong twist-lock photo-electric control receptacle (PECR) in accordance with ANSI C136.41-2013. The driver dimming leads shall be wired to prongs four and five. The PECR shall be rotatable up to 359 degrees. Housing shall provide 360 degree stop to prevent the internal twisting of PECR wire assemblies resulting in potential electrical short. The PECR shall be connected to the same voltage as the luminaire.
- The luminaire shall be labeled internally and externally in accordance with ANSI C136.15.

Electrical Requirements:

- The power supply shall fully operate in a temperature range no less than -20°C to 50°C .
- The electronic driver shall have the following:
 - Rated life of 100,000 hours based on thermal data for the driver case temperature in the luminaire at a 25°C ambient temperature.
 - Input voltage of 120 to 277 volt at 60 Hz.



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- Output frequency >120 to avoid visible flicker.
- A power factor of 0.90 or greater at full load.
- A total harmonic distortion of 20% or less at full load.
- Thermal overload protection.
- Self-limited short circuit protected and over load protected.
- Electrical components that are protected per ANSI/IEEE Standard C62.41, for Category C (10kv/5ka) applications. The transient suppressor is not required to be RoHS compliant.
- Driver case shall meet Ingress Protection (IP) 66 standards.
- Capable of 0-10V dimming.
- Terminated with quick disconnect wire harnesses for easy maintenance. Wire nut termination is not acceptable.
- A terminal block for terminating pole wiring to the luminaire that will accommodate #6 thru #18 American Wire Gauge (AWG) pole wire.

LED Performance Requirements:

- The luminaire shall meet the chromaticity requirements as follows:
 - The standard color for the LED luminaire shall be white. The colors shall conform to the color regions based on the 1931 International Commission on Illumination (CIE) chromaticity diagram.
 - Submittals shall be made for luminaires with Nominal Correlated Color Temperatures of 2,700K ± 300K,
- The luminaire shall have a minimum Color Rendering Index (CRI) of 70.
- The Lumen Maintenance Life (L70) from the TM-21.
- The luminaire shall have an IESNA Backlight, Uplight and Glare (BUG) rating as follows:
 - Backlight rating shall not exceed 3.
 - Uplight rating shall not exceed 0.
 - Glare rating shall not exceed 3.

PROJECT INSTALLATION REQUIREMENTS



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PART I – Procurement/Inventory

Consultant will be responsible for procuring, managing, storing, handling and distributing lighting fixtures and associated materials to complete the installation as defined by the resultant contract. The material procured by the Consultant shall be protected against damage or loss until the materials have been installed, commissioned and accepted by the City of Phoenix.

Inventory: Consultant shall also provide an inventory control plan clearly tracking all incoming shipments and distribution of these materials and provide it to the City. The City of Phoenix reserves the right to inspect the materials while in storage and prior to shipment to the work areas. All records for the incoming and outgoing shipments must be kept on file and made available (electronically) upon request by the City.

PART II – PROGRAM IMPLEMENTATION AND MANAGEMENT

Work Plan: Before installation Consultant shall provide a draft Work Plan for submittal to the City of Phoenix with their original proposal for approval. The Work Plan shall include the following:

- a) Method Statement which outlines the area for which the contractor would like to work, the number of lift trucks and equipment to be used, crew size, number of fixtures to be installed in that area.
- b) CWP "Critical Work Plan" which shall address safety issues that have been identified for each area. The CWP shall provide the method and procedures the contractor intends to use to address and manage the safety of its own workers, Live Electrical circuit, Public Protection, working from heights if methods must be engaged that are not covered within the general work plan and any shift work required.
- c) Traffic Control Plan meeting all the requirements of the Authority having jurisdiction for the streets, roads, high ways and intersections in that area.
- d) Critical Path Schedule
- e) Documentation of public outreach to be provided by Consultant

Installation: Consultant will be responsible for furnishing and installing all LED fixtures as per the proposal schedule.

Consultant is responsible for identification and recording of the pole number and other critical information for each pole, as well as, inspection of the poles general condition, wire leads and connection within the hand hole at the bottom of the pole, wire and fixture tabs/labels, removal of the existing fixture, proper disposal of the existing fixture ballast and lamps, removal and disposal of all dirt debris and packaging materials, installation of the new LED fixture by proper



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distribution type for the area or road way, intersection etc. Also, should the City desire to incorporate controls into the final scope of work for implementation, Consultant is responsible for the installation of all required controls, sensors or other appurtenances involved with the controls equipment.

Consultant shall be responsible for providing all required equipment, rigging, man lifts, misc. items and incidental hardware required for a complete a fully functional installation. The installation must be field tested for intended function prior to calling for inspection.

In the rare instances where a traffic video surveillance camera and/or wireless mesh radio is receiving power from any streetlight photocell, the Consultant shall disconnect the device from the photocell on the existing fixture, install the new LED fixture and notify the Traffic Signal Shop at (602) 262-6021 [available 24/7] of the exact location of the disconnection.

Detailed Installation Procedure for New LED Luminaire and Photoelectric Cell: A summary of the process to replace an existing luminaire with a new LED luminaire and photoelectric cell (PEC) follows. This outline is intended to provide an overview of primary features of the task, and is not intended to cover all aspects of the task. There may be additional steps taken to address items including safety, traffic control and special site conditions.

1. SLT (Street Light Technicians) will drive his/her bucket truck, pre-loaded with the required type and quantity of new LED luminaires and photocells, to the designated street light pole location.
2. Prior to coming to a stop in the roadway, the SLT will turn on the appropriate arrow panel, rotating yellow flashers, or strobe lights on the bucket truck in accordance with the City of Phoenix Traffic Barricade Manual (TBM).
3. Work locations at intersections may require additional temporary traffic control devices and/or City of Phoenix Traffic Restriction And Closure System (TRACS) permits to be furnished, which will require pre-planning.
4. The SLT will stop and park the bucket truck in the roadway to access the designated streetlight.
5. The SLT will view the GIS software program to verify that he/she is at the correct location, and to determine what type and size of new LED luminaire is required to be installed.
6. The SLT will exit the vehicle after verifying that it is safe to enter the roadway.
7. The SLT will be wearing appropriate high-visibility clothing and hard hat at all times while outside of the bucket truck.
8. If applicable, the SLT will set any outriggers of the bucket truck.
9. The SLT will select the correct LED luminaire type from the storage location on the bucket truck for the work location.



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10. The SLT will enter the basket of the bucket truck with the new LED luminaire.
11. The SLT will tie-off his/her safety harness (fall protection) to the basket at the designated location.
12. The SLT will boom-up to the old luminaire location.
13. The SLT will utilize proper PPE due to energized electrical work.
14. The SLT will open the power-door of the old luminaire and disconnect the existing incoming service conductors.
15. The SLT will place wire nuts or other protective covers over the exposed conductors.
16. The SLT will unbolt and remove the old luminaire from the existing arm or tenon of the streetlight pole, and place the old luminaire in the basket using caution during all handling not to break the glass or lamp.
17. The SLT will open the power door of the new LED luminaire, and install the luminaire on the existing arm or tenon of the streetlight pole.
18. The SLT will terminate the existing conductors to the new LED luminaire.
19. If not already pre-installed by the FT, the SLT will install the new photocell in the photocell receptacle of the LED luminaire.
20. The SLT shall ensure that the new fixture is level.
21. Shortly after installation of the photocell the SLT should observe a quick 'flash' on of the luminaire, confirming that the luminaire has been installed properly, has correct voltage and is ready for service.
22. If the 'flash' on is not seen, the SLT will manually cover the eye of the photocell to simulate nighttime conditions to allow for the luminaire to turn on.
23. The SLT will wait for a few seconds to verify that the luminaire turns on.
 - a. If the luminaire does not turn on, the SLT will test and verify the voltage at the terminal block inside the luminaire. If there is inadequate voltage, the SLT will close the power door of the new LED luminaire. If there is adequate voltage, the SLT will install an alternate photocell or LED luminaire and repeat the test.
 - b. If the luminaire does turn on, the SLT will close the power door of the new LED luminaire to complete work.
24. The SLT will boom-down with the old luminaire.
25. The SLT will remove the tie-off to the basket.
26. The SLT will exit the basket of the bucket truck with the old luminaire.
27. The SLT will place the old luminaire in proper storage on the bucket truck.
28. If applicable, the SLT will retract any outriggers of the bucket truck.
29. The SLT will re-enter his/her truck.



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30. Using the GIS system, the SLT will document items including:
 - a. Work completed
 - b. Any power problems (if applicable)
 - c. Any other deficiencies observed (if applicable)
 - d. Any other special notes, problems or concerns (if applicable)
31. Using the GIS program, the SLT will determine the location of the next streetlight pole.
32. The SLT will begin to drive forward to the next designated streetlight pole location.
33. If needed, the SLT will turn off the appropriate arrow panel, rotating yellow flashers, or strobe lights on the bucket truck after accelerating from stop.

Additional steps will be incorporated if nodes, software or other accessories are required.

Daily Reports: The Consultant shall provide daily reports from each of its installation subcontractors' crew leaders, identifying quantities and pole numbers installed per crew. Consultant shall maintain weekly follow up with the City on the incomplete work until completed. Additional conditions to note shall include but are not limited to:

- Pole number modifications
- Unusable mast arms/fitting
- Overhead conflicts (power lines, etc.)
- Bad/missing ground
- Bad wiring/wiring devices
- Photocells for non-converted streetlights/circuits
- Obstructed streetlights (trees, other)
- Additional pole located within design area that are not in the construction plans.

Weekly Reports: Consultant shall provide a weekly progress report which shall be accompanied by an updated Critical Path Schedule. The report shall detail the progress of the overall project by quantities of fixtures installed and commissioned per day and week. Consultant shall indicate in the report any delays which will impact the completion of the project. The intent of the report is to communicate any critical information that will improve coordination and help plan the future work.

Traffic Control: Consultant shall comply with the City of Phoenix Traffic Barricade Manual for all traffic control related activities. The City will have the right to revise the traffic control as they see fit and safe.

Working Days: Consultant will have a total of six hundred eighty-five (685) calendar days from the day the notice to proceed with respect to the Deliverable 1 Work is issued to complete every aspect of work outlined in "Deliverable 1 (Audit and Project Development)" and "Deliverable 2 -- (Project Implementation)". Upon receipt of the Deliverable 2 price quote following completion



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of the Deliverable 1 Work, the City shall issue a Notice to Proceed within 30 days for the Deliverable 2 Work. Any days greater than or less than 30 days for the issuance of the Notice to Proceed with respect to the Deliverable 2 Work shall adjust the overall project duration accordingly.

Measurement and Payment: Consultant costs shall include any and all labor, materials, and equipment in order to meet all the requirements in this Scope of Work.

Special Work Conditions: There are a few areas of the city that require special construction consideration:

- **Light Rail Certification:** A small portion of the work will occur near the City of Phoenix METRO light rail. Consultant recognizes that all work along the METRO light rail route must adhere to the METRO light rail operations and maintenance agreement with the City of Phoenix. Accordingly, all of the Consultant's Street Light Technicians working adjacent to the METRO light rail will successfully complete the METRO light rail 'Track Access Training Course' administered by METRO Operations and Maintenance staff.
- **Joint-Use Poles:** Joint-use poles exist in a very small quantity. Joint-use poles are a utility-company owned power pole with overhead medium voltage cables that include a luminaire and luminaire mast arm for street lighting. In many cases, the luminaire is in very close proximity to the overhead medium voltage power lines which presents a hazard. To mitigate this hazard, Consultant will furnish certified International Brotherhood of Electrical Workers (IBEW) medium-voltage journeyman linemen experienced in working with overhead medium voltage to replace luminaires on joint-use poles when a luminaire is within ten foot (10') of overhead primary electrical lines. Supplemental PPE, tools and equipment will be provided to maintain a safe work environment for the journeyman-linemen.
- **Bluestake:** The Underground Facilities Law per State of Arizona Revised Statutes requires all underground utilities to be marked prior to excavation. This law is commonly referred to as the 'Bluestake' law. The scope of work does not anticipate any excavations and therefore marking of underground facilities will not be required.
- **Deficiencies Observed:** It is the objective of this project to replace existing old luminaries and photocells with new luminaires and photocells. Installation crews will be focused on efficiency and production to meet this objective. It is likely that the Consultant's installation crews will encounter a small number of existing fixtures that are not operating properly or in a state of disrepair, such that the new luminaire may not operate properly or cannot be installed. It is not the purpose of this project for the Consultant to inspect or test street light poles for these problems or deficiencies. During the replacement of luminaires, if a problem or deficiency with a street light pole is found, Consultant will report the observation back to the City. Consultant shall not be responsible for inspecting or testing existing street light fixtures, or for failing to observe



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or recognize a preexisting condition that may be of concern to the City. Consultant understands that the City uses its two existing street light maintenance JOC contractors to resolve problems including power delivery problems.

- Streamlined Response for Repairs Under UCC's Current JOC Maintenance Contract: Utility Construction Company, Inc. (UCC) is the current maintenance contractor for the City of Phoenix for the SRP service area. While the primary purpose of UCC's streetlight technicians working on this LED project will be to replace luminaires (not to attempt to correct unrelated deficiencies or problems); the fact that UCC will be installing the new LED luminaires and providing streetlight maintenance service under the City's existing JOC will allow for streamlined and efficient response to repair problems. Once a problem is discovered by UCC under the LED replacement project, UCC will report to Consultant and to UCC's JOC maintenance team concurrently to expedite response and repairs. This will eliminate the extra steps of 1) the City needing to receive notification from Consultant and 2) the City providing notification to UCC's maintenance team before repairs can be scheduled.

PART III – DOCUMENTATION

Rate Changes: Consultant is responsible for working with Street Transportation staff and the utility companies to make sure all the streetlights are converted into the most optimal utility rate possible.

Rebates: Consultant is responsible for working with local utilities to capture the one-time rebates provided by the utility companies. Consultant shall arrange for collected utility company rebates to be delivered to the City. Contractor will have a total of twenty (20) calendar days after the last streetlight has been installed to submit the final rebate application.

As-Builts: After the completion of Deliverable 2 of the Scope of Work, Consultant shall provide "As-Builts" (in GIS format) to the City for final recording of the new streetlight infrastructure. As-Builts shall be presented to the City in a format where it will be easy to convert the information over to the City's GIS database.

Waste Recycling and Disposal: Consultant will be responsible for recycling all streetlight fixtures in a responsible matter. The process of recycling the old fixtures begins with the removal of the fixture from its existing location and its safe transport back to the Consultant's logistics point. The hazardous component(s) are separated from the fixture and packaged in U.S. Department of Transportation approved containers for pickup and recycling by a local Environmental Protection Agency (EPA) Certified processor. The hazardous materials expected to be recycled under this project are the mercury containing lamps and will be classified as universal waste.

All of the non-hazardous components of the fixtures will be separated, and the value of these recycled materials will be realized by the City as a cost benefit to the project. This includes



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aluminum, copper, steel, glass and plastics. Consultant endeavors to have as much of the recycling work done locally as possible to provide maximum benefit to the community.

The Consultant must provide proof of recycling to the City.



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EXHIBIT B

PAYMENT, ACCEPTANCE OF WORK, AND FEE SCHEDULE

PAYMENT AND FEE SCHEDULE

- The total amount to be remitted by the City to Consultant for the Deliverable 1 Work and the Deliverable 2 Work (collectively, the "Work") satisfactorily performed under this Agreement will not exceed Twenty-Six Million Five Hundred Four Thousand Eight Hundred Eighty Dollars (\$26,504,880). This total fee schedule amount is firmly based upon a count of 96,428 street light fixtures. This total amount is made up of the following main categories from the original cost proposal:

○ Audit and Development phase (the "Deliverable 1 Work"):	\$ 1,205,990
○ Project Implementation phase (the "Deliverable 2 Work"):	\$24,492,119
(Material Warranty \$1,135,823 + Installation \$23,356,296)	
○ <u>10-year warranty for labor (paid annually post construction):</u>	<u>\$ 806,771</u>
○ TOTAL:	\$26,504,880

- Under this Agreement, the City will pay for the Work at the rate(s) specified in the Fee Schedule and that comply with the requirements for Reimbursable Expenses as outlined below, with no additional charges for overhead, benefits, local travel or administrative support. Payments will be made in proportion to the Work performed in Deliverable 1 and no more than ninety percent (90%) of the total contract price will be paid until Deliverable 2 Work is totally completed and accepted by the City.
- Consultant will submit Deliverable 1 Work invoices per the following milestone schedule:

○ Installation of one half of pilot project fixtures:	\$143,271
○ Completion of pilot project fixture installation:	\$143,271
○ Completion of field audit of all luminaires (verified via GIS Map):	\$551,669
○ Delivery of the final Audit report:	\$367,779
- Consultant will submit Deliverable 2 Work monthly invoices on or before the 15th of every month. Each monthly invoice will be accompanied with description and count of all light fixtures retrofitted during the month being invoiced. The monthly invoice will be submitted free of mathematical errors and/or missing supporting documentation. All appropriate documentation will be provided that supports the charges reflected in the monthly invoice. Upon finding of an error and/or missing documentation, the City will return the monthly invoice to the Consultant. Consultant will promptly resubmit the revised monthly invoice to the City. Each revised invoice will document the date that the revised invoice is submitted to the City. Requests for payment must be submitted with a detailed breakdown of all materials installed, percentage of fee schedule being charged, and a detailed description of the Work performed. Failure of City to identify an error



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does not waive any of the City's rights. The City will pay Consultant for Work performed and accepted within 60 days of receipt of an undisputed invoice.

- Consultant will submit invoices for the labor portion of the 10-year warranty to the City on an annual basis at the end of each year following the date of final completion. These annual labor warranty invoices will be in submitted in accordance with the following annual schedule:

○ Year 1	\$ 0
○ Year 2	\$ 0
○ Year 3	\$ 83,245
○ Year 4	\$ 83,669
○ Year 5	\$101,395
○ Year 6	\$102,001
○ Year 7	\$102,612
○ Year 8	\$102,788
○ Year 9	\$103,853
○ Year 10	\$127,208

Invoices will be submitted to:
Street Transportation Department
200 W. Washington Street, 6th Floor
Phoenix, Arizona 85003
ATTN: Mr. Bruce Littleton
Telephone: (602) 262-4690
E-Mail: bruce.littleton@phoenix.gov

ACCEPTANCE OF WORK.

1. The City will accept Deliverable 1 Work as being complete upon acceptance of an invoice for a completed milestone as defined herein.
2. Consultant shall perform the Deliverable 2 Work as set forth in the Scope of Work. When Consultant considers the Deliverable 2 Work to be Substantially Complete (as hereinafter defined) (with the exception of City's execution and delivery of a Certificate of Substantial Completion as provided in this Section), Consultant shall submit to City a Certificate of Substantial Completion. City shall have twenty-one (21) calendar days after receipt of the Certificate of Substantial Completion to review the Deliverable 2 Work for the purpose of determining that it is Substantially Complete. In connection with such review, City may, within such 21-day period, develop, if applicable, the Punchlist (as hereinafter defined). Upon receipt of notice from City that the Deliverable 2 Work is not Substantially Complete, which notice shall describe with specificity its rationale for such determination, Consultant will promptly complete any incomplete items or remedy defective items. City shall,



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within seven (7) calendar days thereafter re-inspect all Deliverable 2 Work completed or remedied by Consultant. Once City determines that the Deliverable 2 Work is Substantially Complete (such determination not to be unreasonably withheld, conditioned or delayed), City shall execute the Certificate of Substantial Completion and return same to Consultant confirming that the Deliverable 2 Work is Substantially Complete, such certificate shall include the Punchlist, if applicable, as well as verification of all outstanding payments due, and retainage and City shall promptly thereafter pay Consultant in accordance with Section 2 hereof and as defined in the Certificate of Substantial Completion.

3. When Consultant considers the Deliverable 2 Work, including the Punchlist, if applicable, to be fully complete in accordance with the Scope of Work, Consultant will notify City that Consultant has achieved Final Completion of the Deliverable 2 Work and that the Deliverable 2 Work is ready for final inspection. City shall inspect the Deliverable 2 Work, including any Punchlist items, and all final required Deliverables, to verify the status of Final Completion as soon as possible after receipt of Consultant's certification that the Deliverable 2 Work is ready for inspection. If City determines that any portion of the Deliverable 2 Work is incomplete and/or defective, City shall promptly notify Consultant in writing of such incomplete and/or defective work, itemizing and describing such remaining items with reasonable particularity. Consultant will promptly complete any incomplete items or remedy defective items after which Consultant shall provide written notice to City that the Deliverable 2 Work is fully complete. City shall re-inspect all work completed or remedied by Consultant as soon as possible after Consultant's notice that the Deliverable 2 Work is fully complete. When City agrees that Consultant has achieved Final Completion of the Deliverable 2 Work in accordance with the Scope of Work (such agreement not to be unreasonably withheld, conditioned or delayed), City shall deliver to Consultant written notice of Final Completion ("Certificate of Final Completion") and release payment of all retainage or other payments due, if any.
4. The following defined terms shall have the meanings set forth below:
 - a. "Certificate of Final Completion" shall mean the written notice executed by City pursuant to Section 3.A.2 above. A fully executed Certificate of Final Completion shall be conclusive evidence that Final Completion of the Deliverable 2 Work had been achieved.
 - b. "Certificate of Substantial Completion" shall mean the written notice executed by City and the Consultant in accordance with Section 3.A.1 above. Such fully executed certificate shall be conclusive evidence that the Deliverable 2 Work is Substantially Complete.



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c. "Final Completion" shall be deemed to have occurred when (a) City agrees in writing that 100% of the Deliverable 2 Work as identified in the Scope of Work has been completed to the reasonable satisfaction of City; (b) Consultant has delivered to City all deliverables required with respect to the Deliverable 2 Work under the Scope of Work and (c) a Certificate of Final Completion has been issued by City, subject to and in accordance with Section 3.A.2 above.

d. "Punchlist" shall mean a list provided by City to Consultant of items of unfinished Deliverable 2 Work, which do not preclude achievement of Substantial Completion, and can be completed within thirty (30) calendar days of the Substantial Completion Date, or a reasonable period if there are mutually agreed upon externalities that preclude such thirty-day period.

e. "Substantial Completion" or "Substantially Complete" shall mean the stage in the progress of the Deliverable 2 Work, where the Deliverable 2 Work is mechanically and electrically complete in accordance with the Scope of Work (except Punchlist items) so that City is able to utilize the Deliverable 2 Work for its intended use or purpose; all commissioning tests, inspections and acceptance procedures have been successfully completed; all required final deliverables set forth in the Scope of Work have been delivered to City and a Certificate of Substantial Completion has been submitted and signed by Consultant to City subject to and in accordance with Section 3.a.1 above.

f. "Substantial Completion Date" shall mean the date of issuance of the Certificate of Substantial Completion as stated on such certificate.

5. The City shall have the following obligations with respect to the performance of the Deliverable 2 Work under this Agreement:

a. Participate in the job inspection walk-through(s) with Consultant and the Subcontractor(s) while determining whether Substantial Completion has been achieved. Upon its approval of the physical aspects of the Deliverable 2 Work (except as set forth in the Punchlist), and its verification of the receipt of all required deliverables, as set forth in the Scope of Work, issue the Certificate of Substantial Completion.

b. Perform a final walk-through of the Deliverable 2 Work and check status of the physical aspects of the Work to determine whether Final Completion has been achieved.

c. Upon receipt of the deliverables set forth in the Scope of Work and verification of Punchlist completion, and upon its approval of the completion of the Deliverable 2 Work, issue a Certificate of Final Completion.



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6. Consultant shall retain care, custody and control and risk of loss of any equipment, supplies and components furnished by Consultant hereunder until the earlier of (i) Substantial Completion Date or (ii) earlier transfer of control of the Deliverable 2 Work to City upon termination of this Agreement (such date the "Risk Transfer Date"). Prior to the Risk Transfer Date, Consultant shall bear the risk of loss for any Deliverable 2 Work and materials delivered and be responsible for and obligated to replace, repair or reconstruct, all at its expense and as promptly as possible, any portion or all of the Deliverable 2 Work that is lost, damaged or destroyed (including any damage or loss that has occurred as the result of Force Majeure) prior to the Risk Transfer Date, except to the extent of intentional misconduct or negligence on the part of City, its employees, agents, lenders, contractors or other representatives or persons over which the City possesses the right of control. City shall bear the risk of loss and full responsibility from and after the Risk Transfer Date. After the Risk Transfer Date, except as may be applicable under the Consultant's express warranties set forth in Exhibit A hereto, Consultant shall have no further responsibility for, and shall not bear any risk of loss or responsibility for repair, replacement or reconstruction with respect to, any loss, damage or destruction to the Deliverable 2 Work. From and after the effective date of this Agreement, City shall retain sufficient interest in the Work as may be required to obtain owner's liability and property insurances.

7. The City hereby agrees to timely provide to Consultant all TRACS permits, GIS data, and other relevant information preceding the commencement of the Deliverable 1 Work. The City will cooperate with Consultant and make available the assistance of such personnel as may be necessary for Consultant's performance of the Deliverable 1 Work hereunder.

**ALL OTHER CONTRACT PRICES, TERMS,
AND CONDITIONS WILL REMAIN THE SAME**

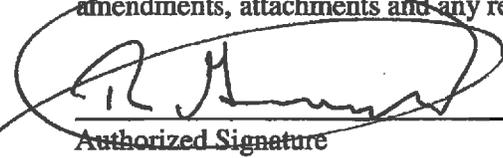


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Ameresco, Inc.

Offeror ~~has read, understands,~~ and will fully and faithfully comply with this solicitation, its amendments, attachments and any referenced documents.



Authorized Signature

3-16-17
Date

Name: Robert Georgeoff
Title: Vice President, Ameresco Inc

Address	111 Speen Street, Suite 410
City, State and Zip Code	Framingham, MA 01701
Telephone Number	(480) 499-9200
Company's Fax Number	(480) 499-9171
Company's Toll Free #	(866) 263-7372
Email Address	rgeorgeoff@ameresco.com

City of Phoenix



Authorized Signature

Name: Ray Dovalina, Jr., P.E.
Title: Street Transportation Director

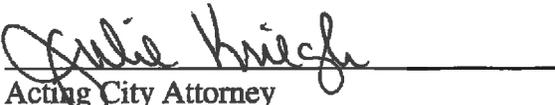
ATTEST:



City Clerk



APPROVED AS TO FORM:



Acting City Attorney

Prepared for
City of Phoenix
Street Transportation Department
Phoenix, Arizona

ORIGINAL

**Proposal for
City of Phoenix
Energy Saving Street Light
Conversion Project:
Energy Services
Contract Model**

Request for Proposal 63-0022

June 13, 2016



City of Phoenix

AMERESCO
Green • Clean • Sustainable





ORIGINAL

Response to Request for Proposal 63-0022

City of Phoenix

**Energy Saving Street Light Conversion Project:
Energy Services Contract**

June 13, 2016

Prepared for

City of Phoenix

Street Transportation Department

Presented by

Ameresco, Inc.

Daniel Hunter

Senior Account Executive

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Suite 1001

Tempe, AZ 85281

P: 480.499.9155

E: dhunter@ameresco.com

This statement of qualifications contains data and information that has been submitted in response to a request for proposals and is provided in confidence. The contents include proprietary information and trade secrets that belong to Ameresco, Inc., (Confidential Information) and is disclosed to the recipient only for purposes of evaluation. In the event Ameresco is awarded a contract or purchase order because of or in connection with the submission of this proposal, Client shall have a limited right as set forth in the governing contract or purchase order to disclose the data herein, but only to the extent expressly allowed. This restriction does not limit the Client's right to use or disclose data obtained without restriction from any source, including the proposer.

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B. Method of Approach

Provide a narrative explanation and supporting documentation that describes how the proposed luminaires will meet the City's illumination and financial objectives as outlined within the Scope of Work.

Ameresco's objectives in selecting a luminaire, based upon the criteria set forth in the City's Request for Proposal were to meet the illumination, ambient temperature and other stated requirements, with a luminaire that offers the most advantageous combination of high efficacy (lumens of light output per watt of energy consumed) and lowest lifecycle cost. Ameresco evaluated multiple lighting manufacturers, including the Acuity Brands (Acuity), AEL Autobahn Series; the Eaton Verdeon Series; and the General Electric (GE) Evolve Series luminaires, as well as luminaires from other manufacturers.

The LED street light luminaire market is rapidly evolving as new chip sets and other innovations drive the introduction of new products offering improved performance and/or lower initial cost. This rapid product evolution has also resulted in many luminaire manufacturers, including Acuity, Eaton and GE, offering multiple roadway luminaire product lines. Commonly, these include a traditional product line that covers the full spectrum of lumen output requirements and a lower cost product line that is intended primarily as a replacement for lower wattage HPS luminaires.

> Proposed LED Luminaire Specifications

Ameresco's staff are familiar with the LED street light luminaires (and control systems) offered by all major manufacturers and have evaluated luminaires and developed LED conversion solutions for dozens of municipal, state DOT and utility customers across the United States and Canada, including customers in high ambient temperature locations like Phoenix. Given varying customer requirements and the constant, rapid pace of innovation and improvement in the performance of LED luminaires, these evaluations are an ongoing process.

In deciding which LED luminaires to propose for our response to this RFP, Ameresco compiled the latest product information from the major manufacturers and undertook a detailed analysis to determine which products meet the City's RFP requirements, and of those, which offered the best lighting solution at the lowest lifecycle cost. This process revealed that the products from three manufacturers – Acuity, Eaton, and GE – stood out from the others from a performance and cost perspective.

Table B.0 provides a comparison of key metrics for RFP-compliant solutions from these three manufacturers in the 4,000K color temperature; Table B.1 provides the same information for the 3,000K color temperature (Ameresco also evaluated 2,700K and 3,500K solutions from each manufacturer). The light green highlight identifies the luminaires that offer the highest efficacy for each LED replacement type, A through E.

manufacturers refresh their products from time to time with new chip sets and other innovations that improve performance, the cadence we have observed from Acuity is considerably more rapid than their competitors. Based on the City's RFP schedule, we believe that it is likely that by the time luminaires are ordered for this project, Acuity will likely have higher performance luminaires available than those proposed.

Additionally, Acuity has shown a willingness to optimize their products for specific customer applications. For example, for City of Pueblo, CO, Acuity developed a new optic for the ATB2 60B luminaire to meet specific lighting requirements for an arterial application. For Phoenix, Acuity is designing a version of their ABTM model with a new optic that they have determined will meet the requirements for the Type D replacement in the 4,000K color temperature (and likely 3,000K as well) with lumen output and wattage similar to the proposed ATBL A1 luminaire at a cost that is approximately \$400,000 less. That product is not currently available; thus, we have not proposed this product. However, Acuity has committed to providing this enhancement within two months of the contract start date, should Ameresco be fortunate enough to be selected.

> Acuity Brands, AEL Autobahn LED Luminaire

Luminaire Performance Requirements

The Acuity Autobahn LED luminaries will replace the following high pressure sodium (HPS) luminaries in the typical street/sidewalk lighting layouts described below:

- Type A – 70 watt HPS
- Type B – 100 watt HPS
- Type C – 150 watt HPS
- Type D – 250 watt HPS
- Type E – 400 watt HPS

Photometric calculations were performed using luminaires for 2,700K, 3,000K, 3,500K and 4,000K correlated color temperatures for each of the lighting layouts provided below. The photometric calculations/measurement points were performed in conformance with IES RP-8-14 and AGI 32 software. The lighting design criteria were based on pavement luminance values with a roadway surface classification of R3. The photometry for 2,700K and 3,500K luminaires used photometric (.ies) files for 3,000K or 4,000K luminaires that were scaled to 2,700L and 3,500K. The original photometric files and scaling factors have been included in the required Appendices. The following values are provided in the Proposed LED Luminaires Performance section below for each lighting layout and all results have been reported to the nearest hundredth.

Minimum Maintained Average Pavement Luminance (cd/m²)

- Average uniformity ratio (Lavg/Lmin)
- Maximum uniformity ratio (Lmax/Lmin)
- Maximum veiling luminance ratio (LVmax/Lavg)

> Type A Luminaire

The Type A fixture will be used for pedestrian/sidewalk lighting. The minimum maintained average pavement luminance shall be 1.00cd/m². The layout should be based on the following criteria:

- Sidewalk width = 10'
- 4' pole setback from edge of sidewalk
- 15' luminaire mounting height
- 2' luminaire arm
- Single-sided lighting
- 65' pole spacing

> Type B Luminaire

The Type B fixture will be used for local street lighting. The minimum maintained average pavement luminance shall be 0.22cd/m². The layout should be based on the following criteria:

- Roadway width = 32' (2-16' lanes)
- 4' pole setback
- 26' luminaire mounting height
- 6' luminaire arm
- Single-sided lighting
- 250' pole spacing

> Type C Luminaire

The Type C fixture will be used for collector street lighting. The minimum maintained average pavement luminance shall be 0.32cd/m². The layout should be based on the following criteria:

- Roadway width = 50' (4-12.5' lanes)
- 4' pole setback
- 34' luminaire mounting height
- 6' luminaire arm
- Single-sided lighting
- 200' pole spacing

> Type D Luminaire

The Type D fixture will be used for arterial street lighting. The minimum maintained average pavement luminance shall be 0.52cd/m². The layout should be based on the following criteria:

- Roadway width = 64' (5-12.8' lanes)
- 4' pole setback
- 35' luminaire mounting height
- 6' luminaire arm
- Single-sided lighting
- 225' pole spacing

> Type E Luminaire

The Type E fixture will be used for wide arterial street single sided lighting. The minimum maintained average pavement luminance shall be 0.75cd/m². The layout should be based on the following criteria:

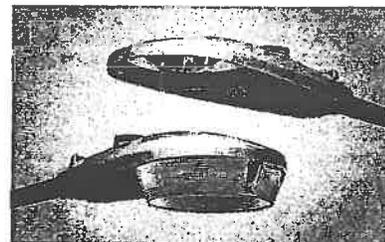
- Roadway width = 74' (6-12.3' lanes)
- 4' pole setback
- 35' luminaire mounting height
- 6' luminaire arm
- Single-sided lighting
- 225' pole spacing

All photometric calculations maintained values based on a Light Loss Factor (LLF) as defined below.

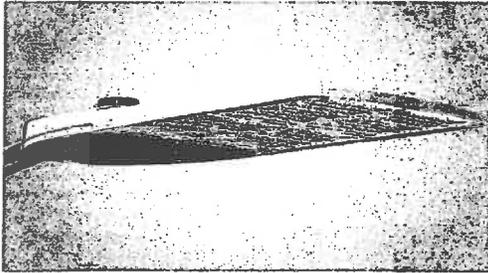
$$LLF = LLD \times LDD$$

Lamp Lumen Depreciation factor (LLD) is the specified percentage of LED lumen maintenance at 70,000 hours and 25°C from the TM-21 report. Luminaire dirt depreciation (LDD) = 0.90.

The proposed Autobahn LED Series luminaires include a combination of high efficacy, lower cost ATBS luminaires for replacement of 70, 100 and 150 watt HPS luminaires, plus the traditional ATB2 luminaires for replacement of 250 and 400 watt HPS luminaires. All of the proposed luminaires are designed to operate in ambient temperatures from -20 to 50 degrees C and are Dark-Sky compliant.



Acuity Brands Autobahn Series ATBS



Acuity Brands Autobahn Series ATB2

We propose to install each of the Autobahn luminaires with an DLL Elite, electronic locking type photocontrol - 20-year fail off long life photocell, or if a wireless mesh network control option is selected, a ROAM control node. The Autobahn Series utilizes the latest LED technology and precision engineered glass optics. The ATB Series provides exceptional illumination while saving energy, and reducing maintenance costs. It also works seamlessly with advanced Acuity Brands controls which allow for

maximized energy savings and enhanced monitoring and reporting functions.

The proposed luminaires meet or exceed the lumen output requirements for all the pole distances and typical lane geometries described in the City Lighting Layout Guidelines. In addition, our photometric analysis shows that these luminaires also meet or exceed the luminance and uniformity recommendations in the IES RP-8-14 guidelines for local, collector and arterial road classifications (for low pedestrian conflict) for these same pole distances and geometries.



DLL Photocell

Further, we based our projected year one energy savings on the kilowatt hour rate identified in the RFP (\$0.07/kWh) and our life-cycle energy savings on the utility escalation rate (1%) identified in the RFP. However, we believe historical industry information as well as energy rate forecasts from the National Institute of Standards and Technology (NIST) would support use of a higher escalation rate should the City be so inclined.



ROAM Control Node

We have provided all supporting documentation in the form of data sheets, installation instructions, and LM80, LM79 and TM-21 test data in Appendix B through O.

> Warranty

For the project, a two (2) year labor warranty and five (5) year warranty for fixtures and hardware (including photocells and/or dimming control nodes) is included to replace any failures at no cost to the City. An incremental cost for 10 year labor and materials warranty has been provided if the City elects to include an extended warrant beyond the standard 2 year labor and 5 year material warranty.

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> Proposed LED Luminaire Performance

The proposed luminaires and their associated performance information has been included in the following tables.

Luminaire Data @ 2,700K

Luminaire	Catalog Number	Input Wattage (FromIES File)	Lumen Output	Efficacy (LPW)	LLD @ 70,000 Hours @25°C	LLD @ 70,000 Hours @40°C	Distribution	Backlight	Uplight	Glare	IES Filename
Luminaire A	ATBS D MVOLT R3	33	3631	110	0.90	0.90	R3	1	0	1	ATBS D XXXXX R3.ies
Luminaire B	ATBS E MVOLT R2	40	4059	101	0.90	0.90	R2	1	0	1	ATBS E XXXXX R2.ies
Luminaire C	ATBM B MVOLT R2	70	6634	95	0.92	0.96	R2	1	0	2	ATBM B XXXXX R2.ies
Luminaire D	ATBL A1 MVOLT N2	164	16980	104	0.95	0.88	N2	3	0	3	ATBL A1 XXXXX N2 27K.ies
Luminaire E	ATB2 80BLEDED MVOLT T1S	276	27744	101	0.92	0.87	R1	3	0	3	ATB2 80BLEDE10 XXXXX T1S 3K.ies

Luminaire Performance @ 2,700K

Luminaire	Catalog Number	Average Luminescence L_{av} (cd/m ²)	Average Uniformity Ratio L_{10}/L_{90}	Maximum Uniformity Ratio L_{1}/L_{99}	Maximum Veiling Luminance Ratio L_{100}/L_{10}
Luminaire A	ATBS D MVOLT R3	1.11	1.91	3.16	0.36
Luminaire B	ATBS E MVOLT R2	0.24	24	112	0.75
Luminaire C	ATBM B MVOLT R2	0.33	3.3	8.7	0.39
Luminaire D	ATBL A1 MVOLT N2	0.52	5.2	23.2	0.52
Luminaire E	ATB2 80BLEDED MVOLT T1S	0.75	18.75	121	0.84

> **Minimum Required Submittals for Proposed LED Luminaires**

Per the City's Request for Proposal, the following submittals have been included as Appendices to Ameresco's *Energy Saving Street Light Conversion Project, Energy Services Contract Proposal*.

- **Appendix B.** Luminaire specification sheet.
- **Appendix C.** LED driver specification sheet.
- **Appendix D.** LM-79 luminaire photometric report. (Not required for 2,700K and 3,500K luminaires.)
- **Appendix E.** In-situ test data to confirm thermal operating temperatures of the luminaire.
- **Appendix F.** LM-80 Lumen maintenance report. (Not required for 2,700K and 3,500K luminaires.)
- **Appendix G.** TM-21 calculations as defined in this specification. The TM-21 Report must show the drive current used for the submitted luminaire. The report may show a larger drive current to represent a worst case scenario. (Not required for 3,500K luminaires.)
- **Appendix H.** Backlight, Uplight, Glare (BUG) rating of the luminaire.
- **Appendix I.** IES chromaticity data from an LED Lighting Facts approved testing laboratory. (Not required for 2,700K and 3,500K luminaires.)
- **Appendix J.** Computer generated point by point photometric analysis.
- **Appendix K.** IES photometric reports including IES electronic file. (Not required for 2,700K and 3,500K luminaires.)
- **Appendix L.** Written product warranty.
- **Appendix M.** Instructions for installation and maintenance.
- **Appendix N.** Technical specifications for the LED luminaires provided in Microsoft Word. Ameresco has identified in writing, on each line of the specification provided by the City of Phoenix, where and on which submitted document the luminaire is shown to be in compliance with the minimum specification. Ameresco has included a separate Microsoft Word files for each luminaire type (A through E) at each correlated color temperature (2,700K, 3,000K, 3,500K and 4,000K) for a total of 20 Microsoft Word files.
- **Appendix O.** Data and performance spreadsheets for the LED luminaires provided in Microsoft Excel. Ameresco has provided a separate Microsoft Excel file for each luminaire type (A through E) at each correlated color temperature (2,700, 3,000K, 3,500K and 4,000K) for a total of 20 Microsoft Excel files (.xlsx). Additionally, each of the 20 Microsoft Excel files have been saved to Adobe Acrobat (.pdf) and are also included as part of Appendix O.

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1. Milestones

Provide a list of milestones and proposed deliverables for each milestone.

> Comprehensive Auditing (including GIS), Engineering and Design

Street lights are woven throughout the entire City of Phoenix; therefore, street light data is most effectively and intuitively managed via a map-based interface. A custom web-based Geographic Information System (GIS) that is aligned with the City’s business needs will be a valuable tool in collecting, managing, querying and reporting data about street light assets. Web and mobile GIS has proven to be a very valuable tool in updating mapping records regarding street lights, and will provide transparency into the Ameresco City of Phoenix Team workflow throughout the entire audit and construction process.

Audit Schedule

This audit process identifies key planning steps and the system must be aligned with the goals of this project for the City of Phoenix. We provide custom IT solutions which take time to implement properly. Starting surveys without a system aligned with the goals of the survey can result in inaccurate data, a less efficient survey team and ultimately less effective decisions based on the data. Implementing new functionality once the system is up and running not only creates new obstacles in terms of making changes to a functioning system, but also may require new data to be collected. This could mean that areas need to be resurveyed. We strongly encourage collaborative planning steps with the City of Phoenix from the beginning of this project. In our experience, doing so saves time in the long run, and will yield a greater ROI for the City’s investment.

The City of Phoenix street light audit is projected to be complete 28 weeks from the date that the City issues a Notice to Proceed for Energy Saving Street Light Conversion Project. Table B.2 outlines the street light audit schedule, broken out by week.

Table B.2. Estimated Street Light Audit Schedule

Week 1	Ramp-Up and Logistics
Week 2	Ramp-Up and Logistics
Week 3	Audit 700 Lights
Week 4	Audit 700 Lights – 1400 Total Lights
Week 5	Audit 1400 Lights – 2800 Total Lights
Week 6	Audit 1400 Lights – 4200 Total Lights
Week 7	Audit 2100 Lights – 6300 Total Lights
Week 8	Audit 2100 Lights – 8400 Total Lights
Week 9	Audit 2800 Lights – 11,200 Total Lights
Week 10	Audit 2800 Lights – 14,000 Total Lights
Week 11	17,500 Total Lights
Week 12	21,000 Total Lights
Week 13	25,200 Total Lights
Week 14	29,400 Total Lights
Week 15	34,300 Total Lights
Week 17	44,100 Total Lights
Week 21	63,700 Total Lights
Week 25	83,300 Total Lights
Week 28	96,428 Total Lights (Audit Complete)

Method of Approach

The solution proposed for the City of Phoenix leverages a connected environment where many users from Ameresco, Ameresco's subcontractors and the City can simultaneously view or edit the central GIS database over the web. The database will be hosted on a server in the Amazon Web Services Cloud, running Microsoft SqlServer Express relational database and Esri ArcGIS for Server. The server will be hosted in the US West (Oregon) Region and the system is fully supported by Amazon, Microsoft and Esri.



Some of the benefits of the system outlined in this proposal are:

1. Multi-person work crews are able to address neighborhoods across the City of Phoenix in a timely and comprehensive manner
2. Geographic patterns (such as stolen copper wire) are able to be identified in the audit process
3. Streamlined communication/troubleshooting between field auditors and project managers
4. Management of installation history throughout project -- essentially creating a live as-built for the City via this approach
5. Loss/breakage of device does not equate to loss of data
6. No daily correcting, reconciling, approving of data edits
7. No daily copying of most recent data to mobile devices
8. More affordable field devices and easy replacement than survey equipment
9. Database is automatically backed up regularly
10. More intuitive user interface than survey equipment
11. Attachments (pictures from the field) are saved as part of database, instead of link to folder
12. Field validation of data to ensure data collected meets requirements for reporting
13. Sharing progress with the City of Phoenix is streamlined and easy

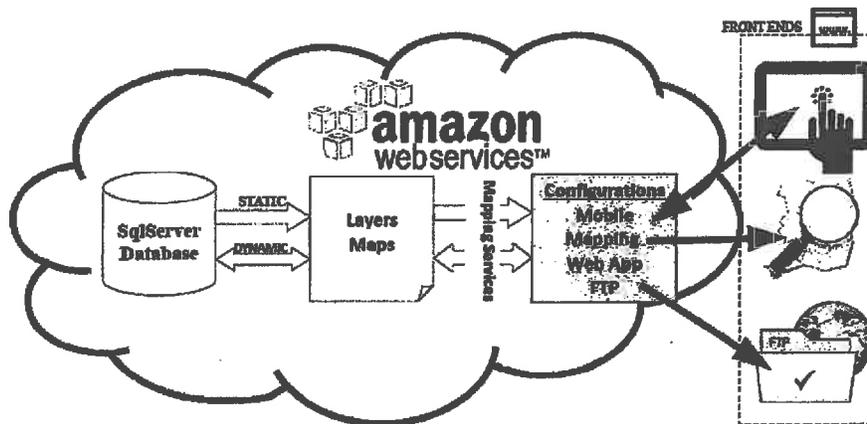
Audit Scope: Three Step Process

Step 1: Design and Deploy Production Systems to Support Field Audit, Conversion and Daily Reporting

The Ameresco City of Phoenix Team will utilize a dependable, tried-and-true process to implement data management and enterprise tier GIS applications developed specifically for street light energy performance and conversion projects. Our goal is not only to collect accurate data in a straightforward and efficient way, but also to provide the City of Phoenix with deep insight and opportunity for guidance into our workflow and progress. Upon Ameresco receiving a Notice to Proceed from the City, the steps below will be followed:

1. Systems Architecture Document Written
2. Development System is Configured, Documented and Tested
3. Production System is Configured and Deployed Using the Documented Process Listed Above

The Systems Architecture document clearly outlines what the system will look like. For example, system drop-down values, such as cobra, double cobra, post-top for "Model" are identified. The Systems Architecture document identifies the target end users and all facets of the system to put in place; it bridges the gap between how an end user interacts with the system and the technical details of implementing the solution. Ameresco will clarify in detail all geographic data and tables, domains, subtypes, mapping services, regularly run processes, web applications and reporting mechanisms which will comprise the system.



Based upon the requirements outlined in the Systems Architecture document, we will build this functionality into a development system running in the US West Region (Oregon) of Amazon Elastic Compute Cloud. As we go through this process, we will note any problems we encounter, as well as steps used to get outlined functionality in place. As each piece of functionality is put into place, we test to confirm that it performs as expected. We will retest each of these pieces of functionality once the server is completely setup. Once the development environment is in place, we will deploy the production

system. While this process may seem extensive, it ultimately saves time and money by forcing the Team to encounter any obstacle earlier in the process and provide the system in which the City of Phoenix desires and expects from the outset of this project. We have found that implementing a comprehensive and well thought-out system up-front is much easier than changing a system once it is in place.

The new GIS database will be placed in a central repository on a cloud server physically located in Oregon. Esri's ArcGIS Server software will be installed and configured to publish the street light data in the form of mapping services. The data will be accessible through four primary ways:

1. An iPad with editable configuration for our auditors
2. An iPad with editable configuration for our installers
3. A publicly available website
4. Through daily exported spreadsheets

These four windows into the system will show the same data. This system architecture is fully supported by Esri, Amazon and Microsoft.

The website will be easy to use and navigate (featuring an interface similar to Google Maps) and will clearly show the real-time "status" of each street light. It will be accessible through any modern smartphone, tablet or web browser on a desktop. The website will give Ameresco's Senior Project Manager and other stakeholders access to see the real-time progress of this project. In addition to the GIS point location, users will be able to select each street light point and view current associated tabular data:

1. From data provided by the SRP and APS,
2. Collected in the field through the audit and installation process, and
3. Calculated programmatically.

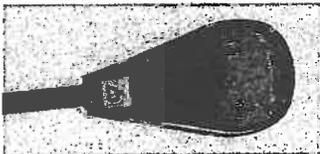


Table B.3. Street Lighting Audit Data Collection

Data	Examples	Method to Calculate/Collect
Status (ObsStatus)		Either manually changed or calculated programmatically. Changed by Ameresco auditors or installers to manage progress.
Keywords (ObsKeywords)	150Hps, Tree, FX2, FX3	Entered manually, this text is used to streamline data entry. Potentially a dropdown.
Original Data from utility (APS, SRP)	Model, Type, Wattage, Location	All data provided by utility will be included in order to make direct comparison. All fields will be prefaced by the utility abbreviation.
Utility (ObsUtility)	APS, SRP	Calculated programmatically based upon the location of the point.
Pole Number (ObsPoleNum)	17623, 56888, 56889, 56890, 51582, 51585, 51586, 51587, 51589, 51590	Confirmed in the field.

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Table B.3. Street Lighting Audit Data Collection

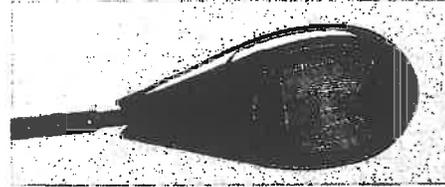
Data	Examples	Method to Calculate/Collect
Model (ObsModel)	Cobra, Posttop, Gateway, Colonial, Other	Collected manually in the field through observation.
Luminaire Wattage (ObsWatt)	70, 100, 150, 250, 400, unknown	Collected manually in the field through observation.
Luminaire Bulb Type (ObsBulbType)	HPS, Other	Collected manually in the field based upon NEMA label or go-back process.
Audit DateTime (ObsAuditDate)	2015-04-17 14:18:22	Calculated automatically. Stored as DateTime type field.
Auditor	Carl Sorenson	Calculated automatically based on who logged in
Install DateTime (ObsInstallDate)	2015-04-23 14:26:36	Calculated automatically based upon last edited datetime. Stored as DateTime type field.
Installer	James Lindmair	Calculated automatically based upon last edited datetime. Stored as DateTime type field.
Field Notes (ObsNotes)	Trees may block installation.	Collected as needed (optional).
Field Pictures (stored as attachments in Geodatabase)		Manual through field observation (optional).
XY Coordinate (Point_X, Point_Y)	-75.94678971, 42.10478509	Programmatically calculated based upon point location. Stored in WGS84 Latitude/Longitude coordinates
Link to Google Maps/ Streetview (GoogleLink)	https://maps.google.com/maps?output=classic&q=42.1048974,-75.94504799&layer=c&cbll=42.1048974,-75.94504799&cbp=11,0,0,0,0	Programmatically calculated based upon point location.
Closest Street Address (Address)	200 W. Washington Street Phoenix, AZ 85003	Calculated Programmatically using US Census Locator. Manually written if far from physical address.

Note: Additional fields may be added through project development.

The color of each street light on the map will be driven by the Current Status. Secondary characteristics which need to be shared as map features will be noted with a halo around the point. For example, we may place a halo around all 250 watt fixtures to focus installation of those fixtures. All GIS data associated will be available by clicking on each point and, as the project progresses and the data is edited by field crews, the Status (and associated GIS point color) of each street light will change in real-time.

Step 2: Field Check All Lights in an Organized and Straightforward Fashion

All lights will be visited and wattage, type, model and the pole number will be confirmed. The point on the map will be moved in order to accurately represent the location of the fixture. Lights that are present in the data, but which are not in the field, will be identified with the conversion status of “NO LIGHT HERE”. Lights which are not in the data, but which are in the field will be added and data will be collected. Lights which meet this criteria will be tracked, as we will not have utility data for these lights. Our auditors and installers will be able to add points, but not delete points, as this would delete the records which should be reported.



Fixture without NEMA Label

The field checking process will be accomplished in a methodical and straightforward manner. Ameresco, as well as the municipal project managers will be able to view the progress through a Google Maps style read-only mapping website.

Our process is such so that our audit team and our installation team are able to work together and transfer knowledge between each other seamlessly. Ameresco and Evari have worked together on past projects, and have successfully deployed this process and system. Again, managers from the City of Phoenix will have access to see the progress of the project.

Street lights are audited through visual inspection from the ground. Determining wattage and type are dependent upon reading the NEMA wattage label on the underside of the fixture. If there is no NEMA sticker, Evari auditors will not be able to collect this information, but collect the location, model, pole number and other information. We will mark these lights with the status “Go Back” so a more detailed audit can be completed by opening the fixture by other qualified personnel on our team. Depending upon how many “Go Back” lights are identified, it may be advantageous to address these lights immediately following the audit process or as part of the conversion process.

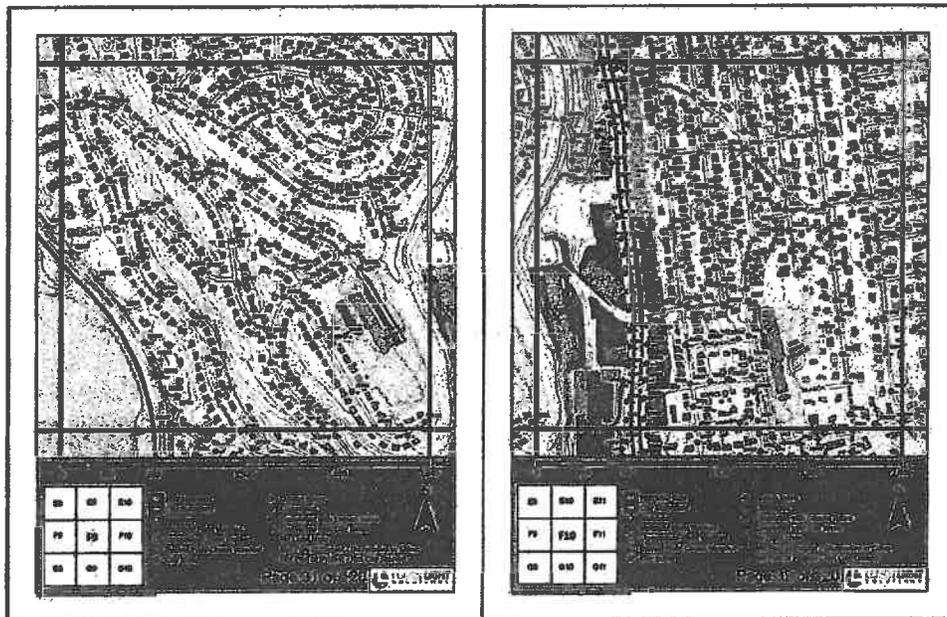
National Electrical Manufacturers Association (NEMA) Wattage Label description:
https://en.wikipedia.org/wiki/NEMA_wattage_label

Step 3: Provide Final Data Submission Products to the City of Phoenix

Page 85 of the Request for Proposals, under Phase 3: Project Completion states, “3.3 Provide records of all newly installed LED street lights in the form of electronic GIS records including all wattages, pole numbers, locations, and other associated information.” The final dataset can be provided in a wide range of proprietary or open GIS database formats. Additionally, the Team can provide this dataset in more accessible formats such as KML, Microsoft Excel or multi-page grid style mapbooks. We have had no issues meeting any past requests and do not anticipate any obstacles with this project. Ultimately, all lights will be audited, and clean data will be submitted to the City of Phoenix in a straightforward and

easy to use format to convert the “As-Builts” (in GIS format) information over to the City’s GIS database system.

As part of the Energy Services Contract project deliverables, the final dataset will include the new LED fixture model, type, wattage, controls, roadway classifications (arterial, collector, and local), pole spacing, pole height for each streetlight fixture and pole locations, as well as, a record of the existing fixture data being replaced. Once the streetlight audit is completed, Ameresco will team with the City to conduct a thorough in-depth “Roadway – Pole Spacing Analysis” to evaluate and field measure agreed upon site samples throughout the City to determine the optimal lighting applications and fixture selections for the City. The agreed upon streetlight information will then be uploaded for each streetlight point on the GIS map. The ability will be provided to click on any one streetlight point on the GIS map to open a drop down box for convenient access to data for coordination planning or during installation in the field. These same GIS audit tools will be used by our installation crews to update the fixture type, wattage and install date throughout the project duration.



Data Attribute Accuracy and Quality Control

Ameresco leverages three primary steps to ensure the data collected represents real world conditions as closely as possible:

1. Data entry protocols and programmatic error checking
2. Training protocols and ongoing oversight
3. An iterative QA/QC process

A single Ameresco Senior Project Manager (SPM) has been identified for this project with the City of Phoenix and will be actively engaged throughout the entirety of the project. During the audit and construction stages of this project, the SPM will be the City's single point of contact for the project and is responsible for logistics, oversight, data accuracy and quality control.

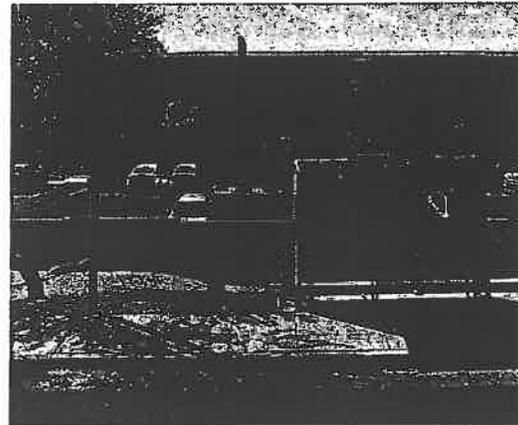
Data entry is highly controlled. Only specific valid entries are allowed. This is accomplished by implementing dropdown lists, number ranges, field types and subtypes. There are only a very limited number of models, types and wattages. By using a limited number of valid entries, we help to ensure data consistency; we also empower the team to enter freehand notes and field pictures to qualify, expand upon or mark for follow-up. Programmatic error checking highlights data which does not meet one of the prescribed combinations. For example, COBRA-HPS-150W is a valid combination, while COBRA-LPS-150 is not. This is likely a data entry error, but will be re-field-checked and fixed.

Initial and ongoing training is key to implementing standards. Entering the correct data comes down to people in the field making decisions. Auditors must have a comprehensive understanding of the infrastructure they are auditing, the system they are using, and what the real-time progress is of the rest of the audit team. There must be a cohesive workflow among all auditors to produce consistent and reliable data. In order to do this, Ameresco implements training protocols with a Senior Project Manager. The first 8 hours of work with any auditor is completed with the single Senior Project Manager. This is the required minimum, and more time is scheduled as needed. This initial period will audit a diversity of areas across the City of Phoenix that are included in the project; from dense urban areas, which can be most effectively walked, to sparse rural roads, where lights may be thousands of feet apart. The SPM also works alongside the team throughout the project. Field team members rotate so that no single crew inadvertently creates their own standards. The SPM organizes the teams and rotates among them to confirm that the data collected is of the highest standards possible. The SPM also leads regular meetings to discuss any newly found fixture types or issues which may arise.

The SPM implements an iterative QA/QC process. This is a backward looking process where data collected is ensured to meet a 99% acceptable error rate. In this process, 100% of the first 1% (900 lights) of the estimated total number of street lights (90,000) is recollected by the SPM. Going forward, 1% of each of the subsequent 10% of the lights collected are independently checked by the SPM. For each 9,000 lights completed, a random 90 lights will be rechecked to confirm that we are consistently meeting or exceeding a 1% error rate. This process identifies any weaknesses, additional training and/or advantageous crew assignments that may need to be put into place to overcome any issues.

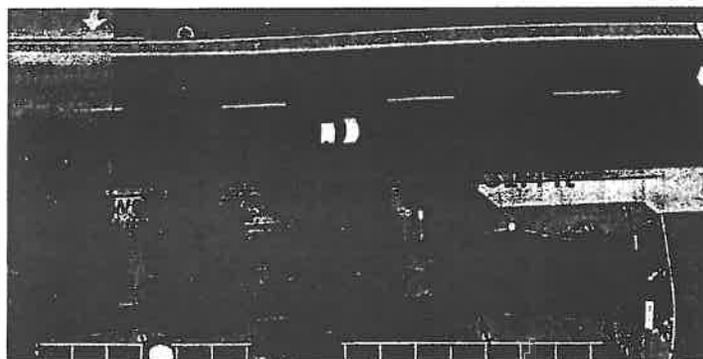
> Spatial Accuracy

The Ameresco City of Phoenix Team will use heads-up-digitizing on iPads in the field to increase the spatial accuracy of the APS and SRP GIS data provided at the outset of the project. The Ameresco team of auditors that will drive the streets are highly adept at placing points based upon features in the aerial photo. Shadows, lot lines, fences, driveways, trees, roofs of buildings and other features in the aerial photo are extremely helpful in accurately placing the point. Great care and attention will be spent on determining where the pole meets the ground and placing the point in as accurate a position as possible to best represent actual location. Gaining access to the highest quality aerial photo available is important in creating the most spatially accurate data. The most valuable aerial photography is a) recently taken, b) high resolution, and c) spatially accurate.



The aerial which will meet our needs, is described by the City of Phoenix as “City of Phoenix 2014 Aerial Imagery. Flown fall 2014. Metro areas captured at 0.25 Foot resolution. Outlying areas captured at 0.80 Foot resolution.” In order to minimize any minor distortion, all data will be collected in Stateplane NAD83 HARN, Arizona Central, International Feet. This will ensure the highest spatial accuracy. As a contractor to the City of Phoenix, we anticipate being provided free access to this aerial through either a mapping service or being provided the actual aerial.

This aerial is viewable at <http://arcg.is/1rOd267>.



The Ameresco City of Phoenix Team will deliver the final data in Esri File Geodatabase format. This will include all tables, domains, subtypes and pictures taken in the field throughout the project within Ameresco's ArcGIS Server/SDE environment. The Team is eager to work with the City in assuring the data is successfully imported into its enterprise GIS. This data will help the City manage its new LED street lighting assets over the long term.

> **Archive**

Data will be archived to a separate file system nightly in a format where it can be republished quickly, if needed. We will also be able to use this to determine what the data looked like on any given day.

> **GPS Trail**

In order to provide comprehensive coverage, audit teams will use a data logger to keep track of where they have been. At the end of each working day, the GPS points are uploaded and appended to the previous days' work. This enables us to confirm that we have surveyed streets, even if no street lights are found; it also empowers our multiple teams to know if an area has been surveyed. Additionally, the points are recorded with the name of the of the survey team so that any data or accuracy collection issues can be identified in the QC process.



> **GIS Integration with Project Management Shipping Information Reporting and Project Management Platform**

The Ameresco team strives to streamline communication among stakeholders, across the Ameresco City of Phoenix Team and with the City of Phoenix, to deliver the highest quality services at the most competitive price.

To that end, Ameresco intends to deeply integrate the role of information technology systems into our workflow for the Energy Saving Street Light Conversion Project. A web- and mobile-based GIS is one of the key components we plan to leverage, however, we also plan to implement a Project Management Shipping Information Reporting (SIR) and Project Management Platform. Our Project Management SIR tool is used to create ship-log spreadsheets to track orders. Our Project Management Platform is a web-based system designed to give both the City and the Team full access to this project, while offering a place for workflow, communication and access to real time updates throughout the project timeline. While these three systems provide different perspectives into the progress of this project for the City of Phoenix, they are deeply interrelated. For example, how many 250 HPS replacements which still need to be installed will come out of GIS reporting, but how many are ordered and/or in transit will originate in the Project Management SIR and Project Management Platform. Ameresco will integrate the three systems in order to bridge the entire workflow – the audit, ordering and delivery to various yards, installation, troubleshooting any issues, submitting for rebates and/or new tariffs (if required), and final commissioning. One manifestation of this integration will be that ordering and inventory information will be shown within the web-based GIS. This will help to avoid issues and identify any problems earlier in the process.

Systems integration will provide a holistic perspective to ensure the project moves along in a straightforward and streamlined way, and will allow the Ameresco City of Phoenix Team to stay focused on meeting or exceeding deadline schedules, and on providing the City real transparency into the entire workflow. Images/screenshots follow.

Safe Auditing Practices

Safety is of utmost concern and priority to Ameresco. Safety is the precondition which must be in place in order to accomplish all of our work for the City of Phoenix during this project. Our audit team always works in pairs when driving. We do not rush or have daily field check quotas. We do not play music, talk on the phone while driving; and texting is strictly prohibited. Our staff only works when they are fully rested and able to focus. We do not encourage our staff to work if they are tired or sick. Our vehicles are always current on their maintenance schedules, are mechanically sound and road worthy. The auditing team will wear yellow reflective vests at all times, and vehicles are clearly identified as work vehicles with magnetic stickers. We actively encourage our audit team to walk or take extra time to safely audit the lights and teams will work in challenging areas when the traffic there is the lightest – we do not hesitate to leave an area and come back when it is less busy.

Sample Phoenix Area GIS Audit

To illustrate the Energy Services Contract GIS Audit Process, Ameresco has performed a mini-audit of four sample areas within the City as noted below in Table B.4. The locations selected for this sample are representative of typical straight sections of roadway found within the City of Phoenix.

Table B.4. Sample Area Locations

Sub-Category	Sample Area Locations of Typical Straight Road Lighting
15	SAMPLE AREA 1: CHANDLER BLVD FROM 32 ND TO S 40 TH
1	SAMPLE AREA 2: EAST ROESER RD, FROM 24 TH HEADING WEST
1	SAMPLE AREA 3: 2832 ROESER
11	SAMPLE AREA 4: NORTH 19 TH AVE, FROM MISSOURI TO CAMELBACK

The roadway configurations were measured in the field for the sample area locations, then used as the basis for the photometric analysis to determine the LED luminaire needed to meet the illumination requirements. The following Sample Area Checklists are an example of the data gathered during the audit process for input into our photometric analysis software. Street view pictures have been included as a visual for each area utilized.

> **Sample Audit Data**

The following data represents a sample of the information that Ameresco would obtain citywide to develop a highly granular schedule of LED replacements that meet the City’s illumination requirements with the lowest possible energy footprint.

The GIS Audit provides data in both graphical and tabular formats to allow for flexibility in analyzing the data and providing meaningful results. The audit can be customized so that all relevant data can be obtained during the audit. For purposes of this sample, we secured only a basic subset of fields to illustrate our design process. The tabular data includes the “Object ID” Field which is keyed to the Aerial Maps provided in following the table. In the live GIS system, the tabular data is available for each fixture location by simply selecting the point on the GIS Map.

Table B.5. Tabular Data

OBJECT ID	Obs Wattage	Obs Type	Obs Model	Mast Angle	Road Class	Pole Spacing	Pole Material	Notes
1	Unknown	LED	Cobrahead	180	Collector	Intersection	Metal	Confirm Wattage- No Sticker
2	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
3	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
4	Unknown	LED	Cobrahead	0	Collector	Intersection	Metal	Confirm Wattage- No Sticker
5	100 Watts	HPS	Cobrahead	180	Collector	OneSided	Metal	
6	100 Watts	HPS	Cobrahead	180	Collector	OneSided	Metal	
7	100 Watts	HPS	Cobrahead	180	Collector	OneSided	Metal	
9	Unknown	HPS	Cobrahead	225	Collector	OneSided	Metal	Confirm Wattage 100?
10	100 Watts	HPS	Cobrahead	180	Collector	OneSided	Wood	
11	100 Watts	HPS	Cobrahead	135	Collector	OneSided	Wood	
12	100 Watts	HPS	Cobrahead	135	Collector	OneSided	Wood	
13	100 Watts	HPS	Cobrahead	135	Collector	OneSided	Wood	
14	100 Watts	HPS	Cobrahead	135	Collector	OneSided	Wood	
15	150 Watts	HPS	Cobrahead	135	Collector	OneSided	Wood	
16	150 Watts	HPS	Cobrahead	180	Collector	OneSided	Wood	
17	150 Watts	HPS	Cobrahead	180	Collector	OneSided	Wood	
18	250 Watts	HPS	Cobrahead	180	Collector	OneSided	Wood	
19	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
20	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
21	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
22	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
23	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
24	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
25	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
26	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
27	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
28	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
29	Unknown	LED	Cobrahead	270	Major	Intersection	Metal	Confirm Wattage- No Sticker
30	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
31	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
32	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
33	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
34	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
35	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
36	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
37	250 Watts	HPS	Cobrahead	0	Collector	Intersection	Metal	
38	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
39	250 Watts	HPS	Shoebox	0	Major	Staggered	Metal	
40	250 Watts	HPS	Shoebox	0	Major	Staggered	Metal	
41	250 Watts	HPS	Shoebox	0	Major	Staggered	Metal	
42	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
43	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
44	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
45	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
46	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
47	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	

Table B.5. Tabular Data

OBJECT ID	Obs Wattage	Obs Type	Obs Model	Mast Angle	Road Class	Pole Spacing	Pole Material	Notes
48	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
49	250 Watts	HPS	Cobrahead	0	Collector	Intersection	Metal	
50	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
51	250 Watts	HPS	Cobrahead	180	Collector	Intersection	Metal	
52	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
53	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
54	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
55	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
56	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
57	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
58	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
59	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
60	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
61	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
62	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
63	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
64	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
65	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
66	250 Watts	HPS	Cobrahead	180	Local	Intersection	Metal	
67	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
68	250 Watts	HPS	Cobrahead	0	local	Intersection	Metal	
69	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
70	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
71	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
72	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
73	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
74	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
75	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
76	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
77	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
78	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
79	250 Watts	HPS	Shoebox	90	Major	Staggered	Metal	
80	250 Watts	HPS	Shoebox	270	Major	Staggered	Metal	
81	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
82	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
83	250 Watts	HPS	Cobrahead	180	Major	Intersection	Metal	
84	250 Watts	HPS	Cobrahead	180	Major	Intersection	Metal	
85	250 Watts	HPS	Cobrahead	0	Major	Intersection	Metal	
86	250 Watts	HPS	Cobrahead	90	Major	Intersection	Metal	
87	250 Watts	HPS	Cobrahead	0	Major	Intersection	Metal	
88	250 Watts	HPS	Cobrahead	270	Major	Intersection	Metal	
89	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
90	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
91	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
92	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
93	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	

Table B.5. Tabular Data

OBJECT ID	Obs Wattage	Obs Type	Obs Model	Mast Angle	Road Class	Pole Spacing	Pole Material	Notes
94	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
95	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
96	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
97	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
98	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
99	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
100	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
101	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
102	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
103	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
104	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
105	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
106	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
107	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
108	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
109	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
110	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
111	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
112	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
113	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
114	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
115	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
116	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
117	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
118	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
119	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
120	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
121	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
122	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
123	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
124	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
125	250 Watts	HPS	Cobrahead	0	Major	Opposite	Metal	
126	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	
127	250 Watts	HPS	Cobrahead	180	Major	Opposite	Metal	

> GIS Graphical Information

**MINI AUDIT
 Phoenix**

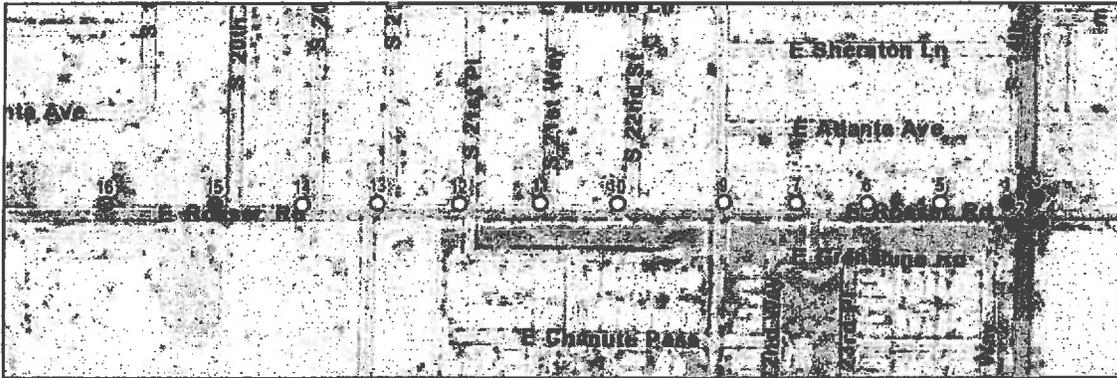
1 inch = 600 feet

**E ROESER RD
 From: 24th heading West**

Labels correspond
 to OBJECTID

Legend

- | | |
|--|--|
| <p>Streetlight Wattage</p> <ul style="list-style-type: none"> ○ 100 Watts ⊙ 150 Watts ● 250 Watts ● Unknown | <p>Streetlight Model</p> <ul style="list-style-type: none"> Square = Shoebox Circle = Cobrahead |
|--|--|



**CHANDLER BLVD
 from: S 32nd
 to: S 40th**

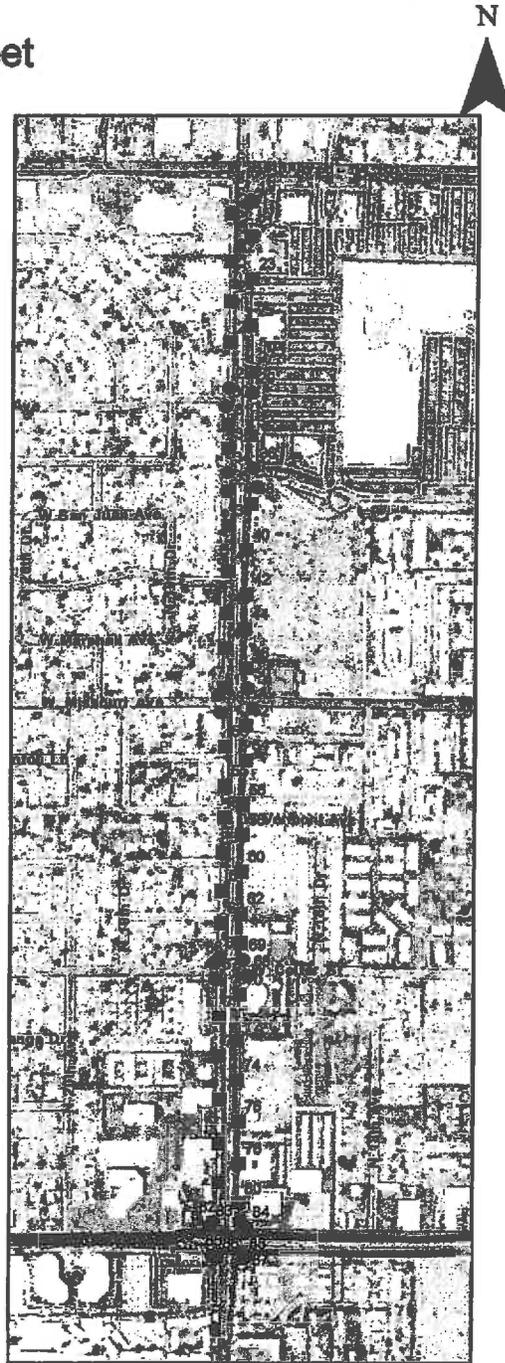


Phoenix Mini-Audit 19th Street

Labels Correspond to ObjectID Values from Table

Legend	
STREETLIGHT	
Wattage (Color)	Model (Shape)
●	250 Watts, Cobrahead
■	250 Watts, Shoebox
●	Unknown, Cobrahead

Scale: 1:9,600



> **GIS Analysis**

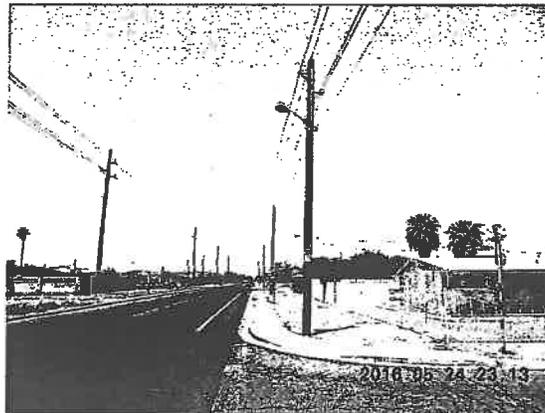
Utilizing the data obtained through the Energy Services Contract GIS Audit, Ameresco can then use the tools provided within the ESRI ArcGIS System to generate the inputs for photometric analysis of each distinct roadway configuration and to determine the most appropriate LED replacement fixture required to meet the IES RP-8-14 practice. Samples of the photometric data inputs for each of the sample areas evaluated follow.

This data would be used to run the photometric analyses and provide fixture options that will meet the City's illumination standards while minimizing energy use.

SAMPLE AREA 1 CHANDLER BLVD. FROM: S. 32ND TO: S. 40TH		
SITE PARAMETERS: SUB-CATEGORY 15 - ARTERIAL COBRA HEAD, 250 W HPS, METAL POLE		
* ROADWAY DATA:	Dimension units (Check one).	<input checked="" type="checkbox"/> Feet <input type="checkbox"/> Meters
	Number of travel lanes "right side"	3
	Width of "right side" travel lanes	12
	Median width	22
	Number of travel lanes "left side"	3
	Width of "left side" travel lanes	12
	Shoulder and gutter width "right" side: (Distance from edge of drive lane to edge of pavement or curb)	0
	Shoulder width "left" side : (Distance from edge of drive lane to edge of pavement or curb)	0
	Pavement Type (Most typical Asphalt is R3, Most typical Concrete is R1)	R3
SIDEWALK DATA:	Sidewalk width	6
	Near edge of sidewalk to edge of drive lanes	0
* LIGHT POLE DATA:	Luminaire mounting height	33.5
	Arm length, horizontal	8
	Luminaires per pole	1
	Pole set-back from travel lane (The distance from near edge of travel lane to pole center. Include shoulder and rain gutter)	8
	Pole spacing (For staggered spacing: the distance along the road between the pole on the "right" side to the pole on the "left" side)	202
	Pole Layout	<input type="checkbox"/> One side <input checked="" type="checkbox"/> Opposite <input type="checkbox"/> Staggered <input type="checkbox"/> Median Mounted

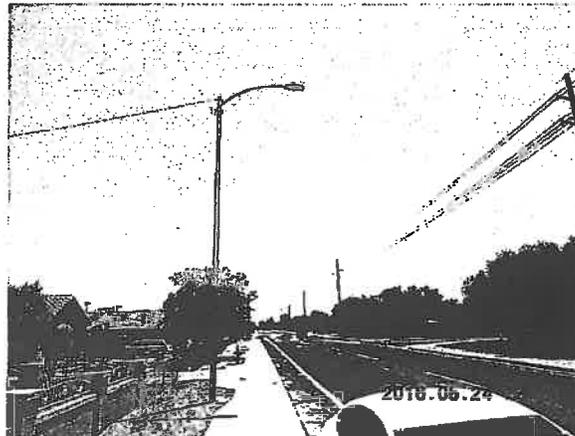


SAMPLE AREA 2 E ROESER RD FROM: 24TH HEADING WEST SITE PARAMETERS: SUB-CATEGORY 1 - COLLECTOR COBRA HEAD, 100 W HPS, WOOD POLE		
* ROADWAY DATA:	Dimension units (Check one).	<input checked="" type="checkbox"/> Feet <input type="checkbox"/> Meters
	Number of travel lanes "right side"	1
	Width of "right side" travel lanes	14
	(Median or Turn Lane) width	-
	Number of travel lanes "left side"	1
	Width of "left side" travel lanes	14
	Shoulder and gutter width "right" side: (Distance from edge of drive lane to edge of pavement or curb)	6
	Shoulder width "left" side : (Distance from edge of drive lane to edge of pavement or curb)	6
Pavement Type (Most typical Asphalt is R3, Most typical Concrete is R1)		R3
SIDEWALK DATA:	Sidewalk width	5
	Near edge of sidewalk to edge of drive lanes	6
* LIGHT POLE DATA:	Luminaire mounting height	26
	Arm length, horizontal	6
	Luminaires per pole	1
	Pole set-back from travel lane (The distance from near edge of travel lane to pole center. Include shoulder and rain gutter)	12
	Pole spacing (For staggered spacing: the distance along the road between the pole on the "right" side to the pole on the "left" side)	348
	Pole Layout	<input checked="" type="checkbox"/> One side <input type="checkbox"/> Opposite <input type="checkbox"/> Staggered <input type="checkbox"/> Median Mounted



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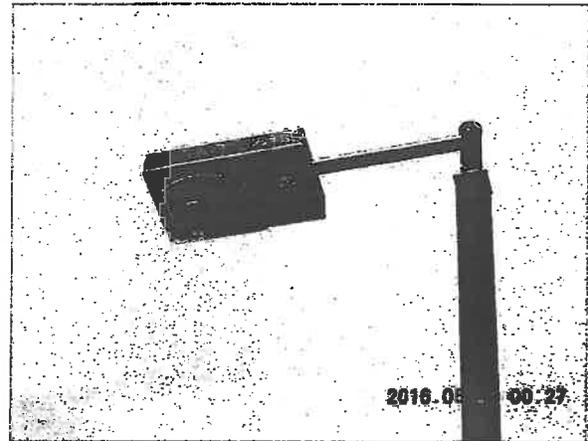
SAMPLE AREA 3 2832 ROESER SITE PARAMETERS SUB-CATEGORY 1 - COLLECTOR COBRA HEAD, 150 W HPS, METAL POLE		
* ROADWAY DATA:	Dimension units (Check one).	<input checked="" type="checkbox"/> Feet <input type="checkbox"/> Meters
	Number of travel lanes "right side"	1
	Width of "right side" travel lanes	14
	(Median or Turn Lane) width	-
	Number of travel lanes "left side"	1
	Width of "left side" travel lanes	14
	Shoulder and gutter width "right" side: (Distance from edge of drive lane to edge of pavement or curb)	6
	Shoulder width "left" side : (Distance from edge of drive lane to edge of pavement or curb)	6
Pavement Type (Most typical Asphalt is R3, Most typical Concrete is R1)	R3	
SIDEWALK DATA:	Sidewalk width	5
	Near edge of sidewalk to edge of drive lanes	6
* LIGHT POLE DATA:	Luminaire mounting height	35
	Arm length, horizontal	10
	Luminaires per pole	1
	Pole set-back from travel lane (The distance from near edge of travel lane to pole center. Include shoulder and rain gutter)	12
	Pole spacing (For staggered spacing: the distance along the road between the pole on the "right" side to the pole on the "left" side)	239
	Pole Layout	<input checked="" type="checkbox"/> One side <input type="checkbox"/> Opposite <input type="checkbox"/> Staggered <input type="checkbox"/> Median Mounted



**SAMPLE AREA 4
 N 19TH AVE
 FROM: MISSOURI TO: CAMELBACK**

**SITE PARAMETERS:
 SUB-CATEGORY 11 -ARTERIAL
 SHOE BOX, 250 W HPS, METAL POLE**

* ROADWAY DATA:	Dimension units (Check one).	<input checked="" type="checkbox"/> Feet <input type="checkbox"/> Meters
	Number of travel lanes "right side"	3
	Width of "right side" travel lanes	12
	Median width	24
	Number of travel lanes "left side"	2
	Width of "left side" travel lanes	12
	Shoulder and gutter width "right" side: (Distance from edge of drive lane to edge of pavement or curb)	0
	Shoulder width "left" side : (Distance from edge of drive lane to edge of pavement or curb)	0
Pavement Type (Most typical Asphalt is R3, Most typical Concrete is R1)		R3
SIDEWALK DATA:	Sidewalk width	6
	Near edge of sidewalk to edge of drive lanes	4
* LIGHT POLE DATA:	Luminaire mounting height	31
	Arm length, horizontal	3
	Luminaires per pole	1
	Pole set-back from travel lane (The distance from near edge of travel lane to pole center. Include shoulder and rain gutter)	1
	Pole spacing (For staggered spacing: the distance along the road between the pole on the "right" side to the pole on the "left" side)	189
	Pole Layout	<input type="checkbox"/> One side <input type="checkbox"/> Opposite <input checked="" type="checkbox"/> Staggered <input type="checkbox"/> Median Mounted



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Savings Calculation Methodology

> Existing Conditions

For this proposal, Ameresco used the information provided by the City of Phoenix as the basis for its offering. Per the table provided in the RFP, this project will encompass 96,428 City-owned street lights. The existing inventory spreadsheet provided by the City contains all of the essential information required to calculate present baseline energy consumption and cost. The wattages of the selected new luminaires provide the expected future consumption. The difference between current baseline and future consumption yields the expected energy savings.

Electric energy is supplied to the City of Phoenix street lights by Arizona Public Service (APS) under schedule E-59. Electric energy is supplied to the City of Phoenix street lights by Salt River Project (SRP) under schedule E-56. A sample utility bill for the month of February, 2015 was provided for the City of Phoenix Energy Saving Street Light Conversion billing information. All of the street lights in the City of Phoenix are unmetered, so the billing for these street lights is the same expense every month. There is a "facility charge" for both utility companies included for every lamp that is installed regardless of whether it is HPS or LED.

> Recommended Modifications

Ameresco recommends standardizing the street lighting with high efficiency light emitting diode (LED) fixtures. The retrofit includes installing new energy efficient LED technology to replace the existing lighting systems to reduce the energy and operational expense of the street lighting systems.

The energy savings associated with this measure will accrue through the operation of more efficient LED fixtures. Direct electric savings are associated with the new fixture reduced wattages.

> Savings Algorithm

Energy savings in this case are determined by comparing the baseline existing calculated kWh used, with the expected kWh consumption after conversion to the new fixtures. Existing energy usage for lighting is calculated from the number of existing light fixtures and their rated wattages as provided in the City inventory. Existing operating hours of the fixtures are based on hours of street light operation per year as provided by the City of Phoenix.

$$\text{Existing kWh} = \text{existing operating hours} \times \text{existing kW}$$

Proposed energy usage after retrofit is calculated based on the proposed number of fixtures and rated wattage. The post-retrofit run hour used in the calculation is the same as the baseline run hour.

$$\text{Proposed kWh} = \text{proposed operating hours} \times \text{proposed kW}$$

$$\text{kWh Savings} = \text{existing kWh} - \text{proposed kWh}$$

$$\text{kWh \$ Savings} = \text{kWh savings} \times \text{Energy Cost}$$

Project Savings Schedule

Using the preceding calculation methodology, project savings for the Acuity AEL Autobahn 4000K fixtures are as shown in the following table:

Table B.6. Project Savings for Acuity AEL Autobahn 4000K Fixtures

Item No.	Existing Inventory			Wattage (Actual)	First Year Energy Consumption Savings (kWh/year)	First Year CO ₂ Emissions Savings (lbs/year)	First Year Energy Cost Savings (\$/year)
	Quantity	Voltage	Wattage (Actual)				
1-A	69	120	85	31	16,022	9,133	\$1,122
2-B	25,289	120	120	31	9,678,100	5,516,517	\$677,467
3-C	3,692	120	176	76	1,587,560	904,909	\$111,129
4-D	10,079	120	293	141	6,587,634	3,754,951	\$461,134
5-E	226	120	451	279	167,150	95,276	\$11,701
6-B	30,226	240	120	31	11,567,490	6,593,469	\$809,724
7-C	3,563	240	176	76	1,532,090	873,291	\$107,246
8-D	16,584	240	293	141	10,839,302	6,178,403	\$758,751
9-E	700	240	451	279	517,720	295,100	\$36,240
10A-C	3,000	120	176	76	1,290,000	735,300	\$90,300
10B-C	3,000	240	176	76	1,290,000	735,300	\$90,300
Total	96,428				45,073,068	25,691,649	\$3,155,115

Assumptions

Annual Operating Hours: 4300
 Electricity Cost: \$0.07
 CO₂ Emission Factor: 0.57 lbs/kwh

Rebates

Ameresco is dedicated to continually working with public utilities; local, state, and federal agencies; and other pertinent organizations to keep abreast of the latest incentive program offerings and guidelines to help maximize the amount of additional funding clients can expect to receive. Ameresco will ensure the final solution meets all incentive requirements from local, state and federal sources. Ameresco strives to bring all possible financial resources together on every project in order to maximize the level of capital improvement and will do so prior to the finalization of any work. Specific steps taken to secure and utilize rebates include the following:

- Assemble the production-based or prescriptive incentive applications
- Submit those applications to the pertinent agency on behalf of the City of Phoenix
- Follow-through with any required reporting and analysis necessary to secure all available rebates, including the processing of rebate-related documents during system installation and commissioning
- Provision of ongoing monitoring and verification services and required documentation in order to access rebate funds earmarked for the relevant project

All of Ameresco's project developers assigned to this project have experience working with the utility companies in Arizona to secure rebates. This experience includes completing the rebate applications, conducting pre- and post- construction site visits with inspectors, and responding to inquiries from utility company staff regarding savings calculations. Throughout the course of the project, Ameresco will continue to look for additional rebate and incentive opportunities which City of Phoenix's project may be qualified to obtain. A sample of our rebate experience on other Ameresco projects includes:

- **Maricopa County:** Secured \$4,928,481 in utility rebates
- **Lake Havasu City:** Secured \$505,127 in utility rebates
- **Arizona State University:** Secured a total of \$52,000,000 in utility rebates since 1999 which has supported a total project value in excess of \$258.9 million
- **Cave Creek Unified School District:** Secured \$473,785 in utility rebates
- **Marana Unified School District:** Secured \$392,000 in utility rebates

> **Arizona Public Service Incentives**

Arizona Public Service (APS) offers incentives for LED lighting retrofits, advanced energy controls, refrigeration equipment upgrades, building envelope enhancements and other electrical equipment improvements that increase energy efficiency and exceed building code requirements. The roadway LED lighting retrofits may qualify under the APS Solutions for Business custom program for commercial projects with an incentive rate at \$0.11 per kWh saved. The City qualifies as an APS large customer based on totalized energy consumption with an annual incentive soft cap of \$500,000, an additional 50% incentive over that, and a hard cap not to exceed 75% of the cost of a project. It is possible for an applicable project to be divided between multiple program years to maximize the total amount of available rebates.

The final incentive amount is subject to a technical review of the energy savings calculations, fixture restrictions, and must meet the minimum requirements of the Arizona Corporate Commission's "Societal Cost Test". The total rebate amount will be determined by APS; however, initial calculations illustrate a potential rebate for the City of Phoenix Energy Saving Street Light Conversion Project of up to \$2,177,867 based on 25,961,224 estimated kWh savings in the APS territory. As of May 2016, APS has paid just under \$5,000,000 in incentives out of a budget of approximately \$19,000,000, with approximately \$14,000,000 remaining in available incentives for the current program year. The Scenarios vary, respectively, according to whether the installation is completed within one calendar year (Scenario 1), or spread across two (Scenario 2) or three (Scenario 3) years.

Table B.7. Estimated Potential Rebate Calculation: Scenario 1

Scenario 1	100%
kWh savings	25,961,224
Rebate @ \$0.11/kWh saved	\$ 2,855,735
Minus \$500k cap	\$ 2,355,735
Additional rebate over cap	\$ 1,177,867
Additional \$500k cap	\$ 500,000
Total Rebate	\$ 1,677,867

Table B.8. Estimated Potential Rebate Calculation: Scenario 2

Scenario 2	Split 50%	Split 50%
kWh savings	12,980,612	12,980,612
Rebate @ \$0.11/kWh saved	\$ 1,427,867	\$ 1,427,867
Minus \$500k cap	\$ 927,867	\$ 927,867
Additional rebate over cap	\$ 463,934	\$ 463,934
Additional \$500k cap	\$ 963,934	\$ 963,934
Total Rebate	\$ 1,927,867	
\$ Over Scenario 1 Rebate	\$ 250,000	

Table B.9. Estimated Potential Rebate Calculation: Scenario 3

Scenario 3	Split 25%	Split 50%	Split 25%
kWh savings	6,490,306	12,980,612	6,490,306
Rebate @ \$0.11/kWh saved	\$ 713,934	\$ 1,427,867	\$ 713,934
Minus \$500k cap	\$ 213,934	\$ 927,867	\$ 213,934
Additional rebate over cap	\$ 106,967	\$ 463,934	\$ 106,967
Additional \$500k cap	\$ 606,967	\$ 963,934	\$ 606,967
Total Rebate	\$ 2,177,867		
\$ Over Scenario 2 Rebate	\$ 500,000		

> **Salt River Project Incentives**

At this time, Salt River Project (SRP) does not provide incentives under rate E-56 for LED street lighting improvements. SRP's rate E-56 for public lighting service is applicable to un-metered lighting applications served from photo cell devices. Monthly energy consumption of streetlights is presently estimated by SRP based on wattage per luminaire. As a result, energy savings incentives from reduced luminaire wattages are not offered under the existing rate structure.

> Implementation

Upon issuance of the Notice to Proceed, Ameresco will meet with the City of Phoenix to conduct a Construction Kick-Off Meeting. An important element of this initial meeting will be to review and discuss the LED street light fixture and photoelectric cell (PEC) specifications so that equipment selections can be finalized and a complete specification package can be prepared and submitted to the City for review and approval. As soon as the submittals are approved, Ameresco will initiate the procurement process with our teaming partners. Four weeks have been allowed for this effort.

Upon approval of the submittals manufacturing can begin. Manufacturing lead time and shipment of the LED street light fixtures and PECs is projected to be:

- Zero (0) units per week for the first 4 weeks
- One thousand (1,000) units per week for the next 4 weeks
- Two thousand (2,200) units per week thereafter

This product review and procurement schedule ensures all street light fixtures and PECs will be installed on a “just-in-time” basis in a total of 52 weeks.

Project Delivery Team

Following is an overview of the strategy, management, logistical efforts and project specific safety plan, the Ameresco City of Phoenix Team will deliver this project in a fashion that maximizes public safety, minimizes cost and provides a fully functional, reliable LED roadway lighting system for the City of Phoenix. Ameresco will oversee, manage and coordinate all construction activity such that minimal input is required from the City of Phoenix staff. A Senior Project Manager has been identified and will be dedicated half time to the project and two Construction Managers will be dedicated full time, including 24/7 response availability for the duration of the project. The SPM and CMs will be responsible for:

- Overall supervision, management and reporting of audit survey, material inventory, installation team and recycling team
- Reporting
- Schedules and scheduling including three week look ahead
- Tracking production levels
- Ensuring all work is being completed in accordance with the contract
- Quality control
- Safety program
- Training for workers as needed
- Weekly progress meetings with the City of Phoenix team
- 4 hour response times 24/7

The installation teams performing the actual field work will consist of two types of workers: Field Technicians (FT) and Street Light Technicians (SLT). There will be one FT with a truck and six SLTs each with a bucket truck per shift. There will be two shifts per day: a day time shift and a swing shift. We will provide a back-up FT with truck and a backup SLT with bucket truck on-call for each 8-hour shift in the event that a scheduled FT or SLT is unable to work or a truck requires maintenance.

> **Overview of Field Technician Role**

The Field Technician (FT) will support the Street Light Technicians by preparing the SLTs daily work effort. The FT will start their shift prior to the SLTs starting their shift. Each shift, the FT will start by reporting to our storage warehouse or the supplier with a truck to pick-up the required types and quantity (approximately 180) of new luminaires and PECs that will be installed during the next 8-hour work shift. The FT will deliver the new luminaires to temporary, secure staging yards strategically located near the areas where the SLTs are working. These yards are provided to reduce travel time for the SLTs in bucket trucks throughout the City.

Upon arrival at the staging yard, the FT will remove the old luminaires one-by-one from the ST bucket trucks from the previous work shift and replace them with the predetermined types and quantity of new LED luminaires so that the trucks are stocked with new fixtures before the SLT report to work to start their shift.

The FT will remain with the bucket trucks and new luminaires until all SLTs have reported for their work shift to protect the luminaires from theft. The FT will also be responsible for fueling bucket trucks and performing safety checks, such as checking fluid levels and tire air pressure.

Once all the bucket trucks are safely on their way to their work destinations, the FT will return the truck now stockpiled with old luminaires, to an alternate location where the old luminaires will be transferred to the recycler's truck for delivery to their warehouse where the fixtures will be completely disassembled and recycled as described below.

The next shift will begin as scheduled, with the next FT commencing with work as outlined above.

> **Overview of Street Light Technician Role**

Street Light Technicians (SLT) will report to work at the staging yards where they will secure their assigned bucket truck, which will, through the efforts of the FT, be ready for the day's work, pre-stocked with new luminaires and PECs. Each SLT will promptly leave the yard to go to work replacing luminaires. Each SLT will complete the replacement of approximately 30 (average) luminaires during his/her work shift. For each street light pole location, the SLT will remove the old luminaire, install the new luminaire and PEC, as detailed below, and place the old luminaire back on the truck. Each SLT will test, commission and enter the site specific installation data into the GIS program for each street light before moving on to the next. At the end of the work shift, the SLT will return the bucket truck to the staging yard with the old luminaires on the truck, ready to be removed by the FT.

Detailed Installation Procedure for New LED Luminaire and Photoelectric Cell

A summary of the process to replace an existing luminaire with a new LED luminaire and photoelectric cell (PCE) follows. This outline is intended to provide an overview of primary features of the task, and is not intended to cover all aspects of the task. There may be additional steps taken to address items including safety, traffic control and special site conditions.

1. SLT will drive his/her bucket truck, pre-loaded with the required type and quantity of new LED luminaires and photocells, to the designated street light pole location.
2. Prior to coming to a stop in the roadway, the SLT will turn on the appropriate arrow panel, rotating yellow flashers, or strobe lights on the bucket truck in accordance with the City of Phoenix Traffic Barricade Manual (TBM).
3. Work locations at intersections may require additional temporary traffic control devices and/or City of Phoenix TRACS permits to be furnished, which will require pre-planning.
4. The SLT will stop and park the bucket truck in the roadway to access the designated streetlight.
5. The SLT will view the GIS software program to verify that he/she is at the correct location, and to determine what type and size of new LED luminaire is required to be installed.
6. The SLT will exit the vehicle after verifying that it is safe to enter the roadway.
7. The SLT will be wearing appropriate high-visibility clothing and hard hat at all times while outside of the bucket truck.
8. If applicable, the SLT will set any outriggers of the bucket truck.
9. The SLT will select the correct LED luminaire type from the storage location on the bucket truck for the work location.
10. The SLT will enter the basket of the bucket truck with the new LED luminaire.
11. The SLT will tie-off his/her safety harness (fall protection) to the basket at the designated location.
12. The SLT will boom-up to the old luminaire location.
13. If applicable, the SLT will utilize proper PPE due to energized electrical work.
14. The SLT will open the power-door of the old luminaire and disconnect the existing incoming service conductors.
15. The SLT will place wire nuts or other protective covers over the exposed conductor.
16. The SLT will unbolt and remove the old luminaire from the existing arm or tenon of the streetlight pole, and place the old luminaire in the basket using caution during all handling not to break the glass or lamp.
17. The SLT will open the power door of the new LED luminaire, and install the luminaire on the existing arm or tenon of the streetlight pole.
18. The SLT will terminate the existing conductors to the new LED luminaire.

19. If not already pre-installed by the FT, the SLT will install the new photocell in the photocell receptacle of the LED luminaire.
20. Shortly after installation of the photocell the SLT should observe a quick 'flash' on of the luminaire, confirming that the luminaire has been installed properly, has correct voltage and is ready for service.
21. If the 'flash' on is not seen, the SLT will manually cover the eye of the photocell to simulate nighttime conditions to allow for the luminaire to turn on.
22. The SLT will wait for a few seconds to verify that the luminaire turns on.
 - a. If the luminaire does not turn on, the SLT will test and verify the voltage at the terminal block inside the luminaire. If there is inadequate voltage, the SLT will close the power door of the new LED luminaire. If there is adequate voltage, the SLT will install an alternate photocell or LED luminaire and repeat the test.
 - b. If the luminaire does turn on, the SLT will close the power door of the new LED luminaire to complete work.
23. The SLT will boom-down with the old luminaire.
24. The SLT will remove the tie-off to the basket.
25. The SLT will exit the basket of the bucket truck with the old luminaire.
26. The SLT will place the old luminaire in proper storage on the bucket truck.
27. If applicable, the SLT will retract any outriggers of the bucket truck.
28. The SLT will re-enter his/her truck.
29. Using the GIS system, the SLT will document items including:
 - a. Work completed
 - b. Any power problems (if applicable)
 - c. Any other deficiencies observed (if applicable)
 - d. Any other special notes, problems or concerns (if applicable)
30. Using the GIS program, the SLT will determine the location of the next streetlight pole.
31. The SLT will begin to drive forward to the next designated streetlight pole location.
32. If needed, the SLT will turn off the appropriate arrow panel, rotating yellow flashers, or strobe lights on the bucket truck after accelerating from stop.

Additional steps will be incorporated if nodes, software or other accessories are required.

It is expected that each location will be completed in a period of about 15 to 20 minutes.

A bucket truck may be equipped with a tow-behind flatbed trailer approximately 12' in length to provide additional storage location for new and old luminaires.

Work Hours and Shift Locations

Day-shifts will primarily focus on local (residential) streets during off-peak traffic hours, when residents are commonly awake, at work, away from their homes and generally less likely to be disrupted by brief work outside their home. Occasionally, work may be completed on major and collector streets during day-time shifts, when warranted.

Night-shifts will focus on major and collector streets, during off-peak traffic hours when traffic levels are very low.

All shifts will work for an 8.5 hour period, including a 30 minute period for lunch-break. The following is a summary of the proposed work shifts:

Table B.10. Work Hours by Shift

	Day-Shift	Night-Shift
Primary Area of Focus	Local Streets	Major and Collector Streets
Secondary Focus	Major and Collector Streets	Local Streets
Days of Week	Monday through Friday (5 shifts per week)	Sunday Evening through Friday Morning (5 shifts per week)
Estimated Start Time	9:00 am	9:00 pm
Estimated End Time	5:30 pm	5:30 am
Total Duration	8.5 Hours	8.5 Hours
Total Work Hours	8.0 Hours	8.0 Hours
Lunch Break	30 Minutes	30 Minutes

These proposed work hours and shifts all comply with the City of Phoenix Traffic Barricade Manual (TBM) requirement that *“Service vehicles are prohibited on Major/Collector streets during peak traffic hours, except when authorized by RMP Agents or under emergency/disaster conditions governed by Police and Fire personnel”* (TBM, page 28).

Exact daily start and end times will be finalized in coordination with the City of Phoenix.

Special considerations may be needed for luminaires located at intersections or on traffic signal poles.

Special Work Conditions

There are a few areas of the city that require special construction consideration.

> **Light Rail Certification**

A small portion of the work will occur near the City of Phoenix METRO light rail. We recognize that all work along the METRO light rail route must adhere to the METRO light rail operations and maintenance agreement with the City of Phoenix. All Street Light Technicians working adjacent to the METRO light rail will successfully complete the METRO light rail ‘Track Access Training Course’ administered by METRO Operations and Maintenance staff.

> **Joint-Use Poles**

Joint-use poles exist in a very small quantity within the service area. Joint-use poles are a utility-company owned power pole with overhead medium-voltage cables that include a luminaire and luminaire mast arm for street lighting. In many cases, the luminaire is in very close proximity to the overhead medium voltage power lines which presents a hazard. To mitigate this hazard, Ameresco will furnish certified International Brotherhood of Electrical Workers (IBEW) medium-voltage journeyman linemen experienced in working with overhead medium voltage to replace luminaires on joint-use poles when a luminaire is within ten foot (10') of overhead primary electrical lines. Supplemental PPE, tools and equipment will be provided to maintain a safe work environment for the journeyman-linemen.

> **Bluestake**

The Underground Facilities Law per State of Arizona Revised Statutes requires all underground utilities to be marked prior to excavation. This law is commonly referred to as the 'Bluestake' law. The scope of work does not anticipate any excavations and therefore marking of underground facilities will not be required.

> **Deficiencies Observed**

It is the objective of this project to replace existing old luminaires and photocells with new luminaires and photocells. Installation crews will be focused on efficiency and production to meet this objective. It is likely that SLTs will encounter a small number of existing fixtures that are not operating properly or in a state of disrepair, such that the new luminaire may not operate properly or cannot be installed. It is not the purpose of this project for SLTs to inspect or test street light poles for these problems of deficiencies. During the replacement of luminaires, if a problem or deficiency with a street light pole is found, we will report the observation back to the City of Phoenix. Ameresco shall not be responsible for inspecting or testing existing street light fixtures, or for failing to observe or recognize a preexisting condition that may be of concern to the City of Phoenix.

Ameresco understands that the City of Phoenix uses its existing street light maintenance JOC contractor to resolve problems including power delivery problems. UCC is the current street light maintenance JOC contractor for the SRP service area.

> **Streamlined Response for Repairs Under UCC's Current JOC Maintenance Contract**

Utility Construction Company, Inc. (UCC) is the current maintenance contractor for the SRP service area. While the primary purpose of UCC's streetlight technicians working on this LED project will be to replace luminaires, not to attempt to correct unrelated deficiencies or problems; the fact that UCC will be installing the new LED luminaires and providing streetlight maintenance service under the City's existing JOC will allow for streamlined and efficient response to repair problems.

Once a problem is discovered by UCC under the LED replacement project, UCC will report to Ameresco and to UCC's JOC maintenance team concurrently to expedite response and repairs. This will eliminate the extra steps of 1) the City of Phoenix needing to receive notification from Ameresco and 2) the City of Phoenix providing notification to UCC's maintenance team before repairs can be scheduled.

> Permits

If and when applicable, Ameresco will secure TRACS permits for above work. No other permits are expected and are therefore not included in this proposal.

Construction Safety

Ameresco will prepare a project specific Accident Prevention Plan (APP) based on Appendix A of U.S. Army Corps of Engineers EM-385-1-1. The APP will include Activity Hazard Analysis (AHA) sheets for each task to educate employees about potential hazards and provide recommendations to complete work safely. Job specific information including but not limited to driver safety, hot work, working near overhead power lines, traffic safety, pedestrian safety, fall protection, use of bucket trucks, night work and personal protective equipment (PPE) will be addressed. All applicable Ameresco City of Phoenix Team members will be required to attend a job specific orientation and training class in part to review safety considerations unique to this project. Ameresco workers will be required to wear a hard hat and high-visibility clothing or safety vest at all times work is being performed. Ameresco electricians will use 1,000V rated electrical safety gloves with working with live equipment. Ameresco electricians will be required to wear flame resistant (FR) shirts meeting the requirements of National Fire Protection Association (NFPA) 70.

> Traffic & Pedestrian Control

Ameresco shall furnish temporary traffic control (TTC) devices as needed to perform work. All TTC devices shall be furnished, placed and maintained in accordance with the City of Phoenix Traffic Barricade Manual (TBM). Work will be completed within major, collector and local roadways, and each of these roadways require consideration for traffic and pedestrian control.

For a vast majority of the work, Ameresco's work will fall under 'Service Vehicle Operation' requirements of the TBM. Figure 5 of the TBM provides an overview and illustration of the requirements, and has been included herein as Figure B.O.

Ameresco will secure TRACS permits for temporary traffic control if required as detailed in section 6400.

> Traffic Signal Poles

Special consideration must be given to work on traffic signal mounted streetlights. Ameresco's approach to work on or near signalized intersections is to take extra care to minimize disruptions to normal traffic and maintain the normal operation of the traffic signal equipment.

Per the City of Phoenix Barricade Manual:

"Special care is required when restricting traffic in the influence area of signals, because signals represent "pinch points" where road users only receive a portion of the "go" time. It is imperative that restrictions within 300' of traffic signals be minimized, and work planned to minimize the duration of such restrictions."

Some of the temporary traffic control strategies that Ameresco may employ while working within the influence area of traffic signals are:

- Planning and phasing of work to ensure that only one lane is restricted in any direction at any time
- Ensure that the duration of work within the influence zone is minimized
- Schedule work during off-peak and overnight hours to minimize influence on traffic
- Utilization of off-duty police officers as necessary
- Utilization of left turn lanes for through traffic as necessary

In addition to traffic control, another consideration when working on traffic signal mounted streetlights is the potential to disrupt normal traffic signal equipment operation. Often, luminaires are controlled by a centrally located photocell that will operate all lights at the intersection, as opposed to each light having its own photocell. This centrally located photocell may be on a single streetlight pole adjacent to the traffic signal controller or within the controller or utility meter pedestal itself. Each signal will need to be evaluated in order to ensure that the newly installed LED luminaires will operate with the control strategy chosen for this project.

Also, there are other devices (such as video detection cameras and ITS wireless communication hardware) that can be mounted on the same mast arm as the streetlight luminaire. Ameresco's streetlight technicians will take extra care to maintain normal operation of this critical equipment.

> **Sidewalks & Crosswalks**

Sidewalks and crosswalks will be maintained when possible and only restricted in accordance with the City of Phoenix TBM. Any restrictions will be coordinated with the applicable City of Phoenix ROW inspector. Ameresco will secure TRACS permits for sidewalk and crosswalk restrictions if required.

> **TRACS Permits**

Based on Ameresco's work falling under the requirement of TBM Figure 5 'Service Vehicle Operation', City of Phoenix TRACS permits are not expected to be required. Regardless, Ameresco will coordinate all efforts and our schedule with the applicable City of Phoenix ROW inspector to keep the City of Phoenix ROW group informed of our location of work and progress. There may be rare occasions that TRACS permits are required due to unique locations of street light poles. In these cases Ameresco will apply for and secure the required TRACS permit in accordance with the City of Phoenix's procedure.

> **Electrical Service from Utility Companies**

All street lights are located in either Arizona Public Service (APS) or SRP (Salt River Project) service areas (individually referred to as the 'utility company', jointly as 'utility companies'), with APS providing service to approximately 55% of street lights and SRP providing service to approximately 45% of street

lights. For both APS and SRP service areas, electrical service is provided to each street light by either underground buried feed or overhead aerial feed.

For underground feeds, the utility company owns and maintains direct-buried conductors or conductors in conduit. The point of ownership from the utility company to the City of Phoenix occurs at the underground termination point of the utility company conductors to the City of Phoenix conductors, generally within a few feet of the base of the street light pole. An underground junction box is commonly installed at this termination point, especially in newer installations. Junction boxes cannot be found in many cases, as the junction box may have never existed (especially in older installations), may be buried or may have been removed. In-line fusing may exist after the termination point within the City of Phoenix conductors, located in the underground junction box or within the street light pole handhole.

Aerial overhead service is provided from overhead power poles, and may span across multiple street light poles providing service to multiple luminaires. The point of ownership from the utility company to the City of Phoenix occurs at the aerial termination point of the utility company conductor to the City of Phoenix wiring, generally within a few feet of the top of the street light pole. This is an exposed termination with no junction box. Aerial in-line fusing may exist after the termination point within the City of Phoenix conductors, prior to the entry of the wire into the pole.

Both underground and overhead electrical service provide uninterrupted and continuous service to each street light pole. This means that internal wiring of each luminaire is hot at all times. The luminaires are controlled by photocell to provide dusk to dawn illumination. All energized City of Phoenix conductors should not exceed 480V.

> Hot Work

Given the nature of the electrical service to each street light, generally Ameresco will not be able to disconnect electrical service to the street lights, meaning that the internal conductors will be energized and hot at all times. Ameresco expects for all luminaires to be replaced under 'Hot-Work' conditions, and will treat all situations as being 'Hot-Work'. Ameresco street light technicians will utilize appropriate safety measures including insulated electrical gloves and insulated bucket trucks when performing hot work.

> **Electrical Service Problems**

Ground faults, shorts, bad fuses, bad terminations and other issues commonly cause problems with delivery of electrical service to the luminaire. This can occur with utility company and City-owned conductors. This can result in the luminaire being out of service. In the event Ameresco finds a street light with inadequate electrical service, Ameresco will take the following measure(s):

1. Fully install and hook-up the new luminaire and photocell regardless of power delivery problems.
2. Document the installation as complete in the GIS system.
3. Document the power delivery problem in the GIS system.
4. Report the problem to the City of Phoenix for resolution by the City of Phoenix.

Ameresco understands that the City of Phoenix uses its existing street light maintenance JOC contractors to resolve problems including power delivery problems.

> **Equipment (Service Vehicles)**

The Ameresco City of Phoenix Team shall furnish service vehicles including pickup trucks and bucket trucks to perform work under this project. All vehicles will be in clean, in good condition and visually appealing to represent Ameresco and the City of Phoenix well and in a professional manner. Each service vehicle will be equipped with a fire extinguisher and first aid kit. Daily pre-use inspections of vehicles will be a requirement included in Ameresco's Accident Prevention Plan. Any vehicle found to be in unsatisfactory condition shall be removed from service by Ameresco.

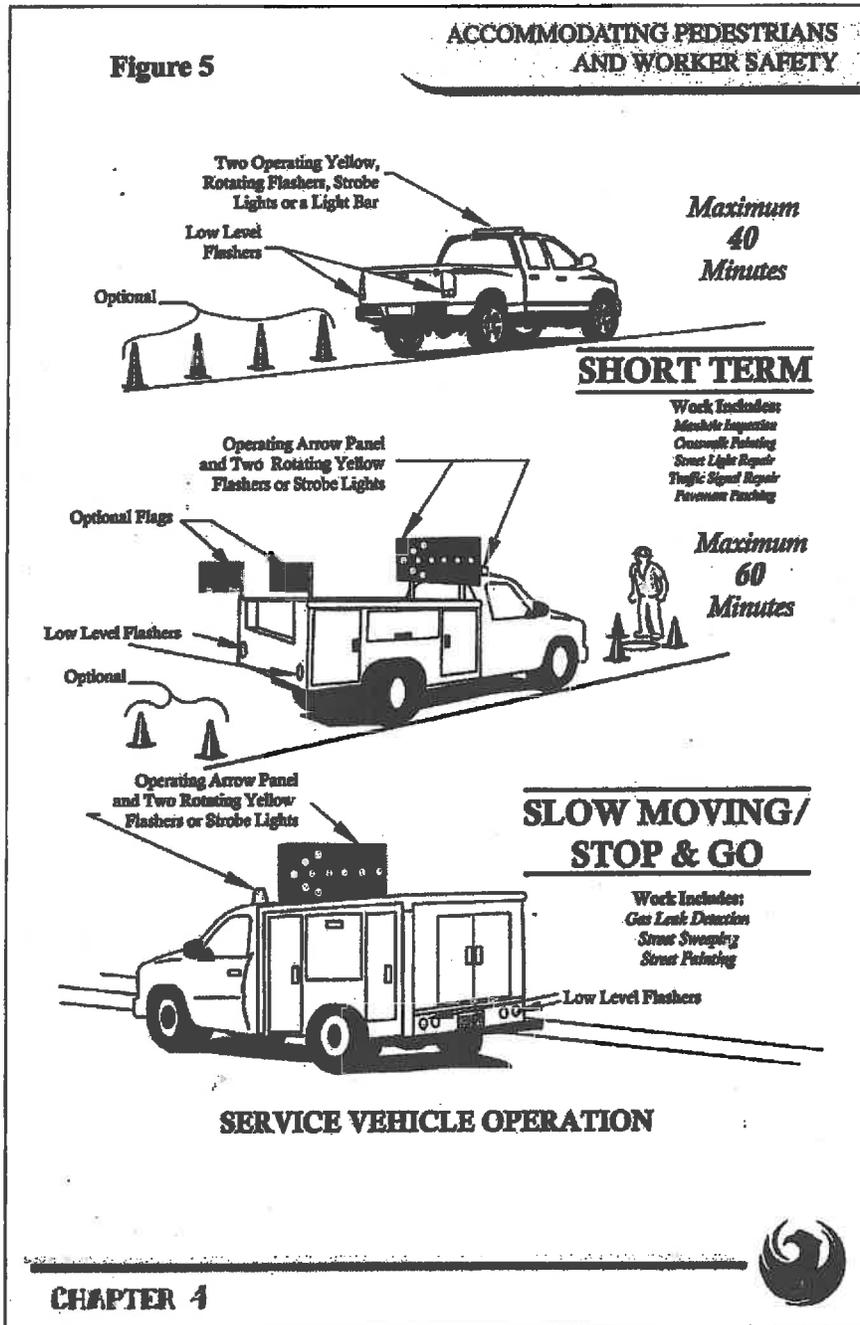


Figure B.0. TBM Figure 5, "Service Vehicle Operation"

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> **Waste Recycling and Disposal**

The street light recycling process is a critical component of a successful project, and ensuring that all hazardous materials are handled and recycled appropriately is the main focus of our efforts in this area. As fixtures are replaced in the field, the Ameresco City of Phoenix Team has specific processes in place to manage those materials, as well as their safe handling and delivery, to the appropriate recycling firm.

The process of recycling the old fixtures begins with the removal of the fixture from its existing location and its safe transport back to our logistics point. The hazardous component(s) are separated from the fixture and packaged in Department of Transportation approved containers for pickup and recycling by a local EPA Certified processor. The hazardous materials expected to be recycled under this project are the mercury containing lamps and will be classified as universal waste. Transport and recycling will be handled by a local specialty firm such as Waste Management, Veolia and Lighting Resources to transport and recycle these lamps.

All of the non-hazardous components of the fixtures will be separated by a local recycling firm, and the value of these recycled materials will be realized by the City as a cost benefit to the project. This includes aluminum, copper, steel, glass and plastics. We endeavor to have as much of the recycling work done locally as possible to provide maximum benefit to the community.

There are many different types of fixtures within the City of Phoenix, and each will have a different makeup of materials to be recycled. Figure B.1 (below) provides a sample depiction of the anticipated recyclable components and where each will be recycled for future use, keeping most of the lighting fixture waste out of local landfills.

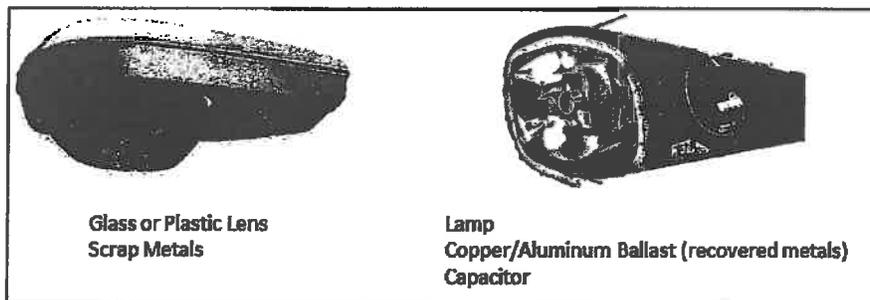


Figure B.1. Anticipated Recyclable Fixture Components

> Measurement and Verification, Warranty and Guarantees

M&V Methodology

Ameresco will coauthor the development of a detailed and comprehensive M&V plan with the City during the Investment Grade Audit, including ongoing monitoring, to ensure actual ongoing savings are attained. This is a critical element of the performance contract because it provides the basis for the energy savings guarantee and debt-service payment. The specific M&V Plan will be submitted with the final IGA and will be included as a schedule in the contract. The frequency of M&V reporting—quarterly, biannually, or annually—will be at the option of the City. All specific protocols must be explained to, and accepted by, the City before project construction can begin. M&V involves two essential components:

1. Verifying the ability of the project to generate all the projected and/or guaranteed savings
2. Measuring actual, periodic performance of the project against the established baseline(s)

While there are a variety of ways to accomplish the two primary M&V tasks, a critical prerequisite is to establish the aforementioned baseline(s). These baselines are developed from a rigorously derived end-use analyses, onsite audits and historical energy consumption data. Techniques range from stipulating all factors affecting ECM performance to installing extensive, highly accurate metering systems. When deciding the appropriate level of sophistication for a particular plan, factors such as complexity of the measure, expected magnitude of savings from the measure, and the client's aversion to risk all affect the decision.

The general approach to determining energy savings in these plans involves comparing the energy use associated with a facility or certain energy consuming systems within a facility before installation of the ECM (baseline) and after installation of the ECM (post-installation).

In general:

$$\text{Energy Savings} = (\text{Baseline Energy Use}) - (\text{Post Installation Energy Use}).$$

The specific algorithms vary from measure to measure, but can all be broken down into baseline and post-installation usage. Sometimes the baseline usage is fixed, while in other cases the baseline is calculated based on the post-installation usage depending on the specific plan used to verify the performance of the measure. In an effort to aid agencies in gaining an understanding of M&V, the IPMVP was established. The IPMVP has four options (A, B, C and D) which meet the needs of a wide range of ECMs and provide industry-approved procedures for baseline development and post-retrofit M&V. These options are flexible and reflect the considerations previously mentioned. Table B.11 provides an overview of the M&V options available to measure the achieved savings of each installed measure.

Table B.11. Summary of M&V Options¹

M&V Option	How Savings are Calculated	Typical Applications
Option A: Partially Measured Retrofit Isolation		
<p>Savings are determined by partial field measurement of the energy use of the system(s) to which an ECM was applied, separate from the energy use of the rest of the facility. Measurements may be either short-term or continuous.</p> <p>Partial measurement means that some but not all parameter(s) may be stipulated, if the total impact of possible stipulation error(s) is not significant to the resultant savings. Careful review of ECM design and installation will ensure that stipulated values fairly represent the probable actual value. Stipulations should be shown in the M&V plan along with analysis of the significance of the error they may introduce.</p>	<p>Engineering calculations using short-term or continuous post-retrofit measurements and stipulations.</p>	<p>Lighting retrofit where power draw is measured periodically. Operating hours of the lights are assumed to be one half hour per day longer than store open hours.</p>
Option B: Retrofit Isolation		
<p>Savings are determined by field measurement of the energy use of the systems to which the ECM was applied, separate from the energy use of the rest of the facility. Short-term or continuous measurements are taken throughout the post-retrofit period.</p>	<p>Engineering calculations using short-term or continuous measurements</p>	<p>Application of controls to vary the load on a constant speed pump using a variable speed drive. Electricity use is measured by a kWh meter installed on the electrical supply to the pump motor. In the base year this meter is in place for a week to verify constant loading. The meter is in place throughout the post-retrofit period to track variations in energy use.</p>
Option C: Whole Facility (Bill Comparison)		
<p>Savings are determined by measuring energy use at the whole facility level. Short-term or continuous measurements are taken throughout the post-retrofit period.</p>	<p>Analysis of whole facility utility meter or sub-meter data using techniques from simple comparison to regression analysis.</p>	<p>Multifaceted energy management program affecting many systems in a building. Energy use is measured by the gas and electric utility meters for a 12-month base year period and throughout the post-retrofit period.</p>
Option D: Calibrated Simulation (Calibrated Building Modeling)		
<p>Savings are determined through simulation of the energy use of components or the whole facility. Simulation routines must be demonstrated to adequately model actual energy performance measured in the facility. This option usually requires considerable skill in calibrated simulation.</p>	<p>Energy use simulation, calibrated with hourly or monthly utility billing data and/or end-use metering.</p>	<p>Multifaceted energy management program affecting many systems in a building but where no base year data are available. Post-retrofit period energy use is measured by the gas and electric utility meters. Base year energy use is determined by simulation using a model calibrated by the post-retrofit period utility data.</p>

¹ Department of Energy International Performance Measurement & Verification Protocol. *Concepts and Options for Determining Energy and Water Savings, Volume I*. Document DOE/GO-102002-1554. March 2002.

Savings Guarantee Provisions

> Performance Guarantees

As an integral part of a performance contract, Ameresco will guarantee a minimum level of energy savings over the full term of the contract, or a shorter term at the discretion of the City. Ameresco's guarantee provides assurance to the City that the cash inflows from the project, which include both energy and operational cost savings, if applicable, will exceed the City's cash requirements for the project, the lease payments and, if applicable and/or desired by the City, any ongoing payments for the provision of O&M services. The City will retain actual annual energy cost savings that exceed Ameresco's guarantee.

Ameresco believes that it is in our clients' best interest to require a savings guarantee from its energy services partner. The chief objective of an ESPC is to use future reductions to the operating budget to amortize the cost of the energy savings performance contract over the term of the financing. Without the guarantee, the client would have no recourse against the energy service company in the event of a savings shortfall.

Typically, Ameresco clients, subject to local statutes, terminate the guarantee and the associated M&V requirements after the third year of performance, as long as the savings have been achieved.

Any O&M savings applied to the project will be stipulated between the two parties. Ameresco will provide detailed calculations and supporting documentation for any O&M savings to the City for review and approval in the IGA. Additionally, the guarantee can be structured to cover the annual M&V and maintenance costs.

At any time during the contract term, should there be a shortfall in energy cost savings identified during the annual reconciliation and correction process; Ameresco will make a payment to the client in the full amount of the shortfall. Payments can be in the form of a check or a credit against future billings from Ameresco, at the client's option. If the cause of the shortfall cannot be repaired, Ameresco will install additional energy conservation measures at Ameresco's expense in order to achieve the savings.

Ameresco's guarantee language included in a standard contract follows.

Guarantee language specific to the City of Phoenix Energy Saving Street Light Project has been included in Section D. Price Proposal, as *Addendum 2 to Attachment A. Energy Services Guarantees*.

SECTION XX: Guarantee of Energy Savings

(a) Ameresco hereby represents and warrants to Customer that the amount of the Annual Energy Cost Savings (as defined in Attachment E) shall equal or exceed the "Guaranteed Savings" (as specified in Table 6(a) below), over the Term (the "Guarantee of Energy Savings").

Table 6(a)

Year	Guaranteed Savings
1	
2	
3	
4	
5	
6	
7	
8	
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10	
11	
12	
13	
14	
15	

For purposes of the Guarantee of Energy Savings, the following assumptions and provisions shall apply:

- (i) Calculation of the Annual Energy Cost Savings, inclusive of energy savings and operational and maintenance cost savings, shall be performed under, and governed by, the methods, formulas and procedures described in Attachment X.
 - (ii) As it relates to the Annual Energy Cost Savings and the Guarantee of Energy Savings, the term "year" shall mean the consecutive 12-month month period beginning with the first day of the month following the date of the Final Delivery and Acceptance Certificate (the *Anniversary Date*), and each similar 12-month period thereafter.
 - (iii) The unit prices, including the escalation thereof, to be used to calculate the Annual Energy Cost Savings for the purposes of the Guarantee of Energy Savings are described in Attachment X.
 - (iv) The Guarantee of Energy Savings herein is subject to Customer performing its maintenance and other obligations under this Agreement. If Customer fails to perform, or fails to properly perform, its obligations under this Agreement or interferes with, or permits any person to take any action which, in the reasonable opinion of Ameresco, prevents the achievement of the Annual Energy Cost Savings under the Guarantee of Energy Savings, then Ameresco may equitably adjust the Annual Energy Cost Savings during the period wherein savings were affected to reflect the same. Ameresco's rights in this section shall not be in limitation of any other rights it possesses under this Agreement.
- (b) Ameresco will perform and submit to Customer a guarantee reconciliation (*Guarantee Reconciliation*) upon the later of (i) 120 days after each Anniversary Date and (ii) 60 days after Customer delivers to Ameresco all utility billing and other data necessary for Ameresco's completion of the Guarantee Reconciliation. The Guarantee Reconciliation will include a calculation of the cumulative Annual Energy Cost Savings achieved in relation to the cumulative Guaranteed Savings for the period being reconciled.
- (c) Ameresco hereby guarantees that if the cumulative Annual Energy Cost Savings realized by Customer as of any Anniversary Date, as detailed in the Guarantee Reconciliation, is less than the cumulative Guaranteed Savings as of such Anniversary Date, then Ameresco will pay to Customer that amount by which the cumulative Guaranteed Savings exceeds the cumulative Annual Energy Cost Savings, such payment to be made within 60 days after the date of the Guarantee Reconciliation. Any such payments made by Ameresco shall be included in the cumulative Annual Energy Cost Savings total for purposes of future Guarantee Reconciliation calculations.

Repayment of Missed Savings

At any time during the contract term, should there be a shortfall in energy cost savings identified during the annual reconciliation and correction process; Ameresco will make a payment to the client in the full amount of the shortfall. Payments can be in the form of a check or a credit against future billings from Ameresco, at the client's option. If the cause of the shortfall cannot be repaired, Ameresco will install additional energy conservation measures at Ameresco's expense in order to achieve the savings.

Treatment of Operational (Non-Utility) Savings

Operational savings are identified during the IGA. While the IGA will identify potential labor savings for the client's staff. Arizona statute prohibits the use of maintenance savings in the cash flow of the project, but the City will benefit from the longer life and reduced maintenance requirements of the LED luminaires.

Situations that Would Void the Guarantee

The equipment installed as part of the performance contract needs to be maintained and operated according to the manufacturer's instructions to ensure that the savings will persist over the term of the project. This can be performed by client's staff or the services can be provided by Ameresco

Warranty / Warranty Point of Contact

As a vendor-neutral energy services company, Ameresco's project developers are able to select the technologies that most effectively achieve a client's unique goals at the lowest possible cost.

Manufacturer-supplied warranties for the systems and equipment installed under the scope of a performance contract are extended to the client upon the issuance of a Certificate of Completion.

Some warranties can be extended by the manufacturer, which will be determined on a case-by-case basis once the final equipment has been selected for an individual project.

The ability of each energy conservation measure to reduce energy consumption is warranted via the performance contract. The term of the contract is determined on a case-by-case basis, with most lasting 10 to 20 years.

Mr. Steve Croxton is the primary point of contact for all warranty issues and will work closely with the warranty and service maintenance team to ensure any and all warranty issues are resolved in a timely manner. Mr. Croxton's resume can be found in Exhibit D. All warranty and M&V issues will be managed out of the Southwest Regional Headquarters, located at 60 E. Rio Salado Parkway, Suite 1001, Tempe, Arizona, 85281.

> Community Outreach

Ameresco recognizes that our success is based on the accomplishments of the past, and on meeting or exceeding our project commitment to our customer's satisfaction. With that in mind, Ameresco has actively been involved with and has partnered with communities in keeping the community abreast of projects and the specific details of each project that will have a direct impact on the public and community as a whole.

Ameresco will partner with The City of Phoenix to abide by and adhere to any standard public outreach processes and procedures in place. Ameresco has and currently is adhering to many Community and Public Outreach Plans, including one for the City of Tucson for the LED Street Light Energy Savings Retrofit Project, which we are currently implementing. At a minimum, Ameresco's community and public outreach will include community notification (via a City website and door hangers) and close coordination with different departments within the City (including public transit) for any and all construction efforts. We will ensure sufficient notice is given, including both timely information, as well as repeat notifications. Ameresco will work with the City of Phoenix in order to ensure that the City's public-facing website is consistently updated with regards to our LED Street Light Energy Savings Retrofit Project. Ameresco will provide the City of Phoenix with at least a two-week look ahead into the schedule of this project, including where we will be working. This information, along with all updates, will also be located on the City website where all construction projects are displayed for City residents.

Additionally, in our past experiences, Ameresco has found it extremely beneficial to partner with cities and their residents to tailor a project specific Community Outreach Plan to meet the specific needs and desires of both the City and its residents in order to gain a better understanding of the concerns of all those impacted by a major, city-wide project. This type of partnership and Community Outreach Plan often becomes a truly powerful force for positive and sustainable change. Should the City of Phoenix desire, Ameresco is committed to working with the City and its residents to define and devise a project specific Community Outreach Plan and strategy that will best fit the needs of the various communities within the City. This Community Outreach Plan would assist in informing the City of Phoenix residents how Ameresco is partnering with the City of Phoenix to achieve their mission "to improve the quality of life in Phoenix through efficient delivery of outstanding public services." In some instances, the methodology and approach will be different for each community; however there are principles, methods and scenarios which will be universally relevant, and can be drawn on for inspiration and guidance. Additionally, this project specific Community Outreach Plan can be amended and modified throughout the project through lessons learned, if deemed beneficial.

We believe that local residents, business people, professionals, officials and politicians who all work creatively together for an intensive period benefit the most from the changes within their community. Conventional boundaries tend to break down, releasing spirit, humor, imagination, positive thinking and collective creativity. Ameresco believes that investing in the community, provides for a greater chance of being able to create and maintain built environments that satisfy both individual and community

needs, and that are enjoyable to live and work in. It is our goal to assist the City of Phoenix to provide excellent public service and safety to all who live, work, and play in the City.

Additionally, Ameresco realistically anticipates that some Phoenix residents will likely have complaints regarding this project. Therefore, in anticipation of these complaints, Ameresco will take light level readings in order to respond appropriately and objectively to any citizen complaints. Furthermore, we will present the City with the ability to dim (from a remote location) these street lights further if needed, in order to reasonably accommodate citizen complaints.

Additionally, Ameresco believes that involvement of the communities we serve is paramount to the success of our projects and thus the communities in which we serve. At Ameresco, we support and opportunities and programs that focus on improving the quality of life in the communities in which we serve, where our customers live, our employees work and reside. Ameresco is proud of being a leader in the energy services industry and providing community sustainability, a business approach for managing economic, environmental and social issues.

Dedication and Public Relations Services

Ameresco often manages press conferences with our customers including initial award announcements, ground breakings, ribbon cuttings, and ceremonial awards (ie: LEED certification or when a community or business receives an environmental award). These events usually involve jointly managing everything -- from 'save the dates' and invitations to the guest lists and inviting media and government affairs representatives, as well as drafting the media advisory, distributing day-of-event press release over the wire and pitching it. For a ribbon cutting, groundbreaking, or ceremonial award, we manage the logistics such as the tent, chairs, and podium rentals and the refreshments. In support of events, we typically develop a project case study for the media kit and posters highlighting and outlining project specifics and the associated benefits. And to ease getting to the event, we provide the signage to direct visitors and press to the event location. With customer approval, our project managers will function as tour guides and describe the project for the invited guests. And of course there is the online component of the press event -- from website postings to online messaging.

When community, leadership, environmental or other awards are available, Ameresco will submit our customers' projects for recognition. Many of our customers have been honored for their leadership and accomplishments in sustainability, efficiency and social responsibility.

2. Work Schedule

Provide a schedule of work consistent with the requirements of the Scope of Work.

Per Addendum No. 2, A19, "The requirement Section B.2., on Page 19 is deleted because of duplication."

A schedule of work consistent with the requirements of the Scope of Work has been provided in Section C. Schedule.

3. Customer Service – Availability

Provide an estimate of key personnel time on each major step. State the work schedule (days and hours) that the contract representative will be available and the anticipated turn around time for returning phone calls. State the availability of assigned personnel to perform the work according to the timing/needs of the City. Provide a brief assessment of the current workload and capacity of the Proposer to carry out the Scope of Work.

Each member of the Ameresco City of Phoenix Team is 100 percent committed to the success of this project. Our team has spent hundreds of hours working together as a seamless unified team developing the best approach on the Energy Saving Street Light Conversion Project. We believe that our strategy for success will provide the greatest benefit to the City of Phoenix, as well as for those who reside or work within the city limits.

The following table (also located in Section A, Table A.5) depicts the estimate of key personnel time at each major step. Ameresco will oversee, manage and coordinate all construction activity such that minimal input is required from the City of Phoenix staff. A Senior Project Manager has been identified and will be dedicated half time to the project and two Construction Managers dedicated full time, including 24/7 response availability for the duration of the project. It is anticipated that all phone calls related to this project are returned within 4 hours.

Each of the firms comprising the Ameresco City of Phoenix Team's is abreast of the work schedule as well as the required needs of the City of Phoenix Energy Saving Street Light Conversion Project, as well as our plan to achieve these needs. Each firm has selected the most skilled, trained and experienced personnel available to perform the work. Each member of the assigned team will be available according to the timing and needs of the City. **No projects currently underway, nor any projects with bids outstanding by Ameresco or its teaming partners, will affect the Ameresco City of Phoenix Team from successfully carrying out the scope of work for the City of Phoenix, and doing so in the most beneficial manner for the City of Phoenix.**

Table B.12. Proposed Ameresco City of Phoenix Team

Key Team Member Licenses/Certifications	Title Teaming Partner Firm	Years of Experience	Estimated Participation
Primary Contact and Account Management			
Daniel Hunter MBA, CEM, FMP	Senior Account Executive Ameresco	8	Varies by Project Stage
Leonard Byrd	Senior Business Developer, Account Support	31	Varies by Project Stage
Contract Negotiation			
Robert Georgeoff	Vice President Ameresco	24	5%
Dan Hering	Director of Business Development Ameresco	31	10%
Timothy Farkas MBA	Finance Director Ameresco	18	50% (if City chooses to finance project)

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Table B.12. Proposed Ameresco City of Phoenix Team

Key Team Member Licenses/Certifications	Title Teaming Partner Firm	Years of Experience	Estimated Participation
Comprehensive Auditing (including GIS), Engineering and Design			
Allen Sehrt PE, CEM, CDSM, GBE, CEA	Director of Project Development Engineering Ameresco	23	10%
Matt Baker CEM	Engineering Team Lead Ameresco	26	20%
Dennis Scanlon PE	Senior Project Development Engineer Ameresco	18	100%
Dean Switzer CEM, CSDM	Senior Project Development Engineer Ameresco	23	100%
Chelsea Wolfman LEED AP BD+C	Associate Project Developer Ameresco	5	75%
Ari Izaak GISP	Founder and CEO Evari GIS Consulting	15	50%
Eric Emrich	Southwest Americas Project Manager and SPM Evari GIS Consulting	8	100%
Carl Sorenson	GIS Administrator Evari GIS Consulting	3	100%
Product Manufacturing and Supply			
Fritz Felten	National Director, LED Lighting & Smart City Solutions Ameresco	10	25%
Troy Harms	Vice President, Infrastructure Sales Acuity Brands Lighting, Inc.	23	25%
Terry Utterback	Vice President, Outdoor Lighting Acuity Brands Lighting, Inc.	37	25%
Greg Heberts LC	Sales Vice President, Western Region Acuity Brands Lighting, Inc.	36	10%
Renee Sekanovich	Director, Infrastructure Sales, Western Region Acuity Brands Lighting, Inc.	19	25%
Kurt Fox	Product Support Manager Acuity Brands Lighting, Inc.	26	25%
John Caratozzolo CEM, LC	Senior Sales Representative, Arizona and Nevada Acuity Brands Lighting, Inc.	30	50%
Logistics and Distribution			
Dean Switzer CEM, CSDM	Senior Project Development Engineer Ameresco	23	25%
Russell Kennedy CCM	Senior Project Manager Ameresco	20	50%
Mike Robertson	Outside Sales Representative Anixter Inc.	38	50%
Jamie Moses LC	Regional Lighting Specialist Anixter Inc.	13	100%
Angie Lewis	Project Manager Anixter Inc.	24	50%
Robin Sabatino	Project Manager Anixter Inc.	16	100%
Project Construction Management, Installation, Commissioning and Safety			
Kevin Nissley CPM, CHST, STSC	Director of Construction and Safety Ameresco	31	25%
Russell Kennedy CCM	Senior Project Manager Ameresco	20	50%

Table B.12. Proposed Ameresco City of Phoenix Team

Key Team Member Name/Contributions	Title Teaming Partner Firm	Years of Experience	Estimated Participation
TJ Baehre	Construction Project Manager Ameresco	31	100%
James Lindmair CEM	Construction Project Manager Ameresco	24	100%
Bob Martin	Vice President/Installation Program Manager Utility Construction Company	17	20%
Bruce Farmer	Vice President/Installation Program Manager Contractors West	26	25%
Jess Daniels CEM, IMSA	Project Manager Utility Construction Company	11	75%
Mark Gildenstern	Project Manager Utility Construction Company	14	100%
David Hale	General Superintendent Contractors West	31	25%
Chad Harper IMSA	General Superintendent Utility Construction Company	21	100%
Chris Harper IMSA	General Superintendent Utility Construction Company	21	100%
Jason Fox IMSA	Project Foreman Contractors West	17	50%
Justin Hatch IMSA	Project Foreman Contractors West	18	50%
Rafael Sanchez IMSA	Project Foreman Contractors West	14	50%
Myrick Sanderson	Project Foreman Utility Construction Company	11	100%
Duane Strohmeier IMSA	Project Foreman Contractors West	26	50%
Chad Stubbs IMSA	Project Foreman Contractors West	21	50%
Waste Recycling and Disposal			
Russell Kennedy CCM	Senior Project Manager Ameresco	20	50%
Warranty Administration			
Steven Croxton MBA, CEM, CBCP	Regional Energy Manager Ameresco	24	20%
Troy Harms	Vice President, Infrastructure Sales, Acuity Brands Lighting, Inc.	23	10%
Mike Robertson	Outside Sales Representative Anixter Inc.	38	10%
Bob Martin	Vice President/Installation Program Manager Utility Construction Company	17	20%

4. Customer Service – Office Resources

State or describe the on-site resources such as office space, conference rooms, clerical support for meeting arrangements as relevant to the services provided.

Ameresco has maintained a fully-staffed office within the Phoenix metropolitan area for over 16 years and is located at 60 E. Rio Salado Parkway, Suite 1001, Tempe, Arizona 85281. Ameresco's Tempe location also serves as the Southwest Regional Headquarters and is 10,739 SF and includes dozens of offices, as well as additional cubicle work areas. The office includes three conference rooms each fully-equipped with up-to-date audio visual equipment, as well as restrooms, break room, two production/copy rooms and a lobby/reception area. This office houses onsite resources that include, but are not limited to Ameresco's Vice President and individual authorized to bind firm; business developers, sales executives and sales assistant; project development engineers and an assistant project developer; construction directors and project managers; a renewable energy team of management, engineers, developers and interns; a regional planning and operations department; energy managers; software solutions; marketing/proposal development; accounting and subcontracting professionals; climate neutrality staff; and a receptionist/office manager. Our local office is more than sufficient to meet all of the needs of the Ameresco City of Phoenix Team and can be used to assist in the development and execution of this contract with the City of Phoenix.

Ameresco's long-term local presence has been instrumental in the development of this project. Our extended experience within the local marketplace lends itself to the most competitive pricing from teaming partners and pre-qualified subcontractors, as well as a working knowledge of all the laws, regulations and guidelines for the City of Phoenix. Our permanent local presence assures the City of Phoenix that we are fully-staffed and eager to provide the most timely and effective customer service in response to the Energy Saving Street Light Conversion Project.

5. Sample Reports

Describe or provide a sample progress report or form.

As outlined earlier, the web and mobile based Geographic Information System (GIS) audit will generate reports which will show daily progress throughout the audit period and provide “real-time” as-built records of the existing HPS street light inventory. Additionally, we plan to implement a Project Management Shipping Information Reporting (SIR) and Project Management Platform. Our Project Management SIR tool is a Microsoft-based system used to create ship-log spreadsheets to track orders. Our Project Management Platform is a web-based system designed to give both the City and the Team full access to this project, while offering a place for workflow, communication and access to real time updates throughout the project timeline. While these three systems provide different perspectives into the progress of this project for the City of Phoenix, they are deeply interrelated. For example, how many 250 HPS replacements which still need to be installed will come out of GIS reporting, but how many are ordered and/or in transit will originate in the Project Management SIR and Project Management Platform. Ameresco will integrate the three systems in order to bridge the entire workflow – the audit, ordering and delivery to various yards, installation, troubleshooting any issues, submitting for rebates and/or new tariffs (if required), final commissioning, and recycling/disposal. One manifestation of this integration will be that ordering and inventory information will be shown within the web-based GIS. This will help to avoid issues and identify any problems earlier in the process.

Systems integration will provide a holistic perspective to ensure the project moves along in a straightforward and streamlined way, and will allow the Ameresco City of Phoenix Team to stay focused on meeting or exceeding deadline schedules, and on providing the City real transparency into the entire workflow.

6. Technology

Describe how your firm uses technology in performing services.

> Overview

The Ameresco team strives to streamline communication among stakeholders, across the Ameresco City of Phoenix Team and with the City of Phoenix, to deliver the highest quality services at the most competitive price. As stated previously, Ameresco intends to deeply integrate the role of information technology systems into our workflow for the Energy Saving Street Light Conversion Project

The Ameresco City of Phoenix Team will utilize technology in a variety of ways to perform services throughout this project, and the City will realize additional value years after this project has been completed due to the way in which we plan to utilize technology for this project. Our solution for the City of Phoenix leverages a connected environment where many users from the City can simultaneously view the status of our project throughout each stage of the project. The Team will be able to manage this project and receive reports real time over the web and the City will be able to view or edit the central GIS database over the web.

Systems integration will provide a holistic perspective to ensure the project moves along in a straightforward and streamlined way, and will allow the Ameresco City of Phoenix Team to stay focused on meeting or exceeding schedules, and on providing the City real transparency into the entire workflow.

> Benefits

Benefits of the way in which we will utilize technology for the City include the following:

1. Real-time, web-based reports for project management purposes
2. Multi-person work crews who are able to address neighborhoods all across the City of Phoenix in a timely and comprehensive manner
3. Transparent and efficient processes for audit and installation
4. Streamlined communication/troubleshooting between our field personnel and the City's personnel
5. Management of installation history throughout project – essentially, we will be creating a live as-built for the City
6. No daily correcting, reconciling, approving of data edits; and no need for daily copying of most recent data to mobile devices
7. Database is automatically backed up regularly
8. More intuitive user interface
9. Attachments (pictures from the field) are saved as part of database, instead of link to folder
10. Field validation of data to ensure data collected meets requirements for reporting

11. Sharing progress with the City of Phoenix throughout the audit, procurement, installation and recycling phases is streamlined and easy
12. Real-time visibility to all aspects of project progress
13. Web-based platform
14. Common platform for all stakeholders
15. Access by only those selected by the City of Phoenix and Ameresco
16. Transparency, and ultimately accountability
17. Customization for this project
18. Stock Availability of GE fixtures, including Stock Number Lookup
19. File Attachments – backup documentation can be attached to various reports, and files may be launched from Web Browser
20. Automated email notification

7. Budget Controls

Describe the fiscal accounting processes and budgetary controls that you will use to ensure the responsible use and management of contract funds and accurate invoicing (if applicable).

Project budgets are drafted and approved up front, and managed/monitored closely on a monthly basis. Purchase orders are issued through the accounting system that line up with the approved subcontracts/vendors that will be providing third-party assistance, and invoices are vouched directly against those purchase orders. As invoices are prepared, project managers review those drafts with the contracted party prior to submission in order to ensure accurate and timely invoice processing. Appropriate supporting documentation is provided as applicable.

State how costs incurred under this project will be appropriately accounted for and only applicable project expenses will be billed to the City of Phoenix.

All projects are assigned a unique project number. All contracts, purchase orders, and invoices must have the unique project number that it applies to and that is printed on the document before it will be processed. Projects are tracked systematically, with all costs incurred being approved by an appropriate party prior to coding in the accounting system. The accounting system reports on costs incurred under a project, and those costs align with pre-approved budgets (referenced above). Any deviations are reviewed on a timely basis.

State your fiscal reporting and monitoring capabilities (e.g. spread sheets, automated fiscal reports, quality controls, checks and balances) to ensure contract funds are managed responsibly.

Ameresco uses Microsoft Dynamics SL Enterprise Resource Solution (ERP) software that combines project management and accounting capabilities that provide enhanced control and insight. Each project is assigned a unique project number and segregated by project phase – development,

construction, and post construction. Each project is further defined by a Work Breakdown Structure (WBS) relevant to the individual work elements/packages within each project.

Ameresco's project managers have real-time access to project-level costs incurred through web-based software tools and reports. On a monthly basis, a formal review of project costs is completed with financial analysts and the project manager's supervisors to ensure the accounting system is accurately reflecting the position/progress/status of the project. Project subledger reports are reconciled to the accounting system on a monthly basis, to ensure completeness and accuracy of reports.

Describe the procedures that you will take to ensure that the City receives satisfactory products and services at low costs, i.e., how will your firm strive to provide the best value at the lowest price.

Ameresco's track record of building – and in many instances operating and maintaining – varied renewable energy and energy efficiency projects attests to the integrity of our Quality Control and Quality Assurance Program (QCQAP). The purpose of QCQAP is three-fold:

- To ensure that the project meets all of the customer-specific requirements as defined in the Statement of Work and other contract documents.
- To ensure that Ameresco complies with all federal, state, interstate and local laws, codes, and regulations for the design, construction and operation and maintenance of the proposed system.
- To ensure that the project reliably delivers the project outcomes in a consistently safe and reliable manner, and in accordance with all environmental and other permitting requirements.

Through Ameresco's extensive experience delivering street light projects, we have become well-versed in meeting the associated quality control requirements. We have also developed systems to assure that our teaming partners and suppliers comply with these requirements through proper training and education, and flow-down provisions in our subcontracts.

> Best Value: Team Selection

Ameresco's goal throughout this entire RFP process centered on the objective of providing the **best value solution to the City of Phoenix at the lowest possible cost; both first cost and life cycle cost.** After analyzing the City's RFP and after attempting to put ourselves in the City's position, we defined best value as striking the optimum balance between; accuracy & robust usefulness of the GIS audit, confirmed access to and delivery of all specified products, quality and speed of installation, efficiency of our recycling efforts, maximizing uniformity of light distribution through the City based on City's current lighting requirements, ease of project acceptance on behalf of the City, lowest possible first & life cycle cost, and safety. Many of the steps that guided the development of this response will serve as the foundation for monitoring and controlling the "value equation" throughout the project to final acceptance by the City.

Each teaming partner that comprises the **Ameresco City of Phoenix Team (Team)** was selected because of their specific skills, talents, best value pricing, experience and expertise in order to align impeccably with the expectations and requirements of the City of Phoenix Energy Saving Street Light Conversion Contract. **Ameresco's union with these partners has created a Team whose qualifications and experience in LED street light conversion is unrivaled, providing the best value project to the City of Phoenix at the lowest possible costs.** Teaming partners include the following firms:

- Acuity Brands Lighting, Inc. LED street light manufacturer.
- Utility Construction Company, Inc. LED street lighting replacement installation contractor.
- Contractors West, Inc. LED street lighting replacement installation contractor.
- Anixter Inc. LED street light distributor.
- Evari GIS Consulting, Inc. Geographic Information Systems (GIS) technology contractor.

Once we had conducted all of our in-depth interviews and identified our best value team, **Ameresco worked with each teaming partner in order to create a Teaming Agreement.** It is significant to note that each of these Teaming Agreements was created in a collaborative manner, with all Teaming Partners participating. In this way, our Team collectively created a holistic, informed, best value approach and solution for the City at the lowest price possible. Once this approach and solution was organized, we created a very descriptive and specific scope of work in each individual Teaming Agreement for each individual Teaming Partner. Each of our Teaming Agreements contains a detailed scope of work with an accompanying price which will constitute the basis for each of our Subcontracts and/or Purchase Orders with each of our Partners. These Teaming Agreements are available to the City upon request.

The effort detailed above included a rigorous examination of pricing. Product pricing is the result of a combination of market-based competition and comparison to our experience on past jobs of similar scope. The installation pricing was triangulated down to the number of installation minutes per pole and compared to industry standards and our experience on multiple projects installed in multiple areas of the country. Ameresco's objective is to deliver the most competitive and best value price possible, while simultaneously not placing our installation subcontractors in a position to cut any corners or to deliver a substandard or unsafe installation. The recycling price has been derived based on a market analysis of various metals to be harvested from the waste, the labor associated with sorting the myriad of parts and pieces which get disassembled from the old luminaries and the type of storage and material handling processes associated with the work. No detail was minute enough to not be rigorously scrutinized.

Finally, Ameresco conducted a detailed, multi-phased final analysis of all the pricing components associated with this project from a holistic perspective, looking again for any cost savings. This included an analysis of tax law, bonding requirement, extended material and labor warranties and the like. In the end, we feel confident that our process has yielded the optimum value equation on behalf to the City.

> **Design Quality Control Procedure**

Ameresco is differentiated from many other bidders by the fact that we are a full-service energy engineering, design and construction management organization. We have over 300 personnel with professional engineering (PE) registrations and/or a professional certification in an energy management related discipline, including Registered Electrical Engineers, Lighting Certification (LC), Certified Energy Manager (CEM), and Certified Energy Auditor (CEA). For the City of Phoenix Energy Saving Street Light Conversion Project, we will also utilize the lighting design resources of the luminaire manufacturers to ensure that the lighting installed meets the City's light level requirements.

> **Construction Quality Control Procedure**

At the beginning of each project Ameresco designates a project Quality Control Manager (QCM). The QCM for this project will be our Senior Project Manager, Russell Kennedy. The QCM is given full authority and responsibility to direct, implement and maintain the overall quality of materials and installation at the project level, and has authority to stop work and resolve problems

Ameresco's project QCM will be responsible for scheduling and arranging for site inspections – including the City inspection described in the RFP, and documenting compliance with Ameresco's QCQAP and construction specifications. The QCM also oversees subcontractor quality control personnel to ensure that all work on the project complies with the contract requirements. The QCM's key responsibilities are as follows.

- Plan, schedule, and arrange construction inspections.
- Develop and implement inspection procedures and records to document compliance with project specifications and drawings.
- Develop, communicate, and distribute status reports.
- Provide accurate and timely reporting of deficiency items through non-conformance reports (NCR). Follow up and ensure corrections of said items.
- Develop and implement a document control records management system.
- Review and approve or reject subcontractor submittals.
- Retain specialists or outside firms as needed for inspection of work in areas where additional technical knowledge is required (mechanical, electrical, electronics, controls, communications, welding, structural, etc.).
- Develop effective communications and work processes with the Ameresco City of Phoenix Team construction personnel and the City project personnel.
- Prior to the start of each definable feature of work, ensure that a Preparatory Phase meeting is held with responsible field and office representatives.
- Provide progress reports to the City of Phoenix Team.
- Exercise authority to stop work if necessary.
- Review and approve subcontractor quality control plans.

> Inspection and Testing

The QCM is responsible for maintaining direct oversight and/or inspection of all tasks performed, including but not limited to material supply, fabrication, transportation and construction activities of teaming partners and suppliers. Their objective is to ensure compliance with the contract documents. All materials and equipment utilized in the performance of the project will be properly inspected and compliance with the contract is documented. Materials and equipment are typically visually inspected for required stamping, labeling, certifications, documentation, etc.

All luminaires received by the Ameresco City of Phoenix Team will be inspected with regard to previously approved samples, specifications and/or shop drawings, and are either approved or rejected. Any luminaires that fail to meet the necessary standards will be clearly marked, set aside from useable material, and returned to the manufacturer. Ameresco's QC procedures include documentation that the inspections of materials were performed and that they are in compliance with project specifications, drawings and approved submittals.

In order to protect against late delivery of materials or equipment and keep the project on schedule, Ameresco will implement and maintain a materials management plan and constantly monitor production and delivery dates.

> Maintaining Workmanship and Material Quality Control

In addition to a strong QC/QA program, our project management teams "manage the details" by inspecting each phase of the work for quality workmanship, documenting inspection results for both materials inspections and workmanship. Project expectations are clear to all team members, be it engineers, safety, quality, or subcontractors and those expectations are repeated at frequent team meetings. The Senior Project Manager knows and understands each aspect of the construction effort and maintains an open line of communication with the project engineers. Project construction management personnel maintain a constant presence on the job site and project engineers make frequent visits to the job site.

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C. Schedule

Provide a schedule of work consistent with the requirements of the Scope of Work.

A schedule of work consistent with the requirements of the Scope of Work can be found as part of Ameresco's response to question 2 in section B. Work Schedule.

The following project schedule is consistent with the Scope of Work, the major milestones and deliverables detailed in the preceding pages, and is based on installation rates of 2,000 luminaires per week once fully mobilized.

> Accelerated Energy Savings

The sooner the fixtures are converted, the sooner the City of Phoenix will begin to realize savings. The schedule of work proposed by the Ameresco City of Phoenix Team under this Energy Services Contract Option delivers these savings in a 21 month period; the 24 month construction period contemplated in the RFP will delay savings. Once fully implemented, the City of Phoenix will recognize approximately \$237,000 to \$262,000 in savings each month depending on which color temperature is selected.

Table C.0. Accelerated Energy Savings

Correlated Color Temperature	Monthly Savings	Additional Savings from a 21 Month Construction Period
2,700K	\$237,072	\$711,217
3,000K	\$244,825	\$734,475
3,500K	\$244,755	\$734,266
4,000K	\$262,926	\$788,779

Completing the installation of the fixtures in 21 months instead of 24 will accelerate over \$711,000 of savings. The advantage of the Energy Services Contract and Investment Grade Audit process is the ability to select the correct fixture to provide the required light levels at each type of roadway and pole spacing without over lighting an area. This will produce more energy savings than replacing fixtures based on the existing wattage. This approach saved an additional 10% off of the baseline in our project with the City of Tucson. An additional 10% of energy savings off of the baseline would equate to an additional \$51,000 of savings per month. If wireless controls are selected then an additional 3% of energy savings will be realized. This is an additional \$13,000 per month of savings if the savings can be monetized through negotiation with APS and SRP.

> Potential for Schedule Improvement

In discussions with Acuity, there may be an opportunity to shorten the lead time on the first fixtures shipped for the project. Every week that we can shorten the lead time on the fixtures or the installation time will equate to an additional \$54,000 of savings for the City of Phoenix. The actual lead time on the fixtures will not be known until closer to construction, and is influenced by the availability of components, as well as the backlog of orders at the factory.



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D. Price Proposal

Proposers shall submit prices in accordance with the Price Pages(s) included herein in the "Submittal", Section IX. This Price Page represents the City of Phoenix's official request for price quotation and MUST be completed by the Proposer. The pricing stated herein must be a firm fee; except, existing inventory quantities are estimated, and payment will be based on actual quantities installed. Unless otherwise and specifically provided, the price is all inclusive and must include all necessary costs including, but not limited to, materials, labor, travel, copying costs, incidentals, equipment, space, taxes, profit, insurance and any other items necessary to effectively conduct and complete the Scope of Work.

The City has clearly stated its objectives for this RFP. There Price Proposal submitted herein is compliant with:

- Reducing maximum energy use and annual cost of street lights by converting up to 100,000 existing street lights on arterial, collector and local streets to LED fixtures or equivalent;
 - Ameresco's design and implementation approach to LED street light conversion projects emphasizes meeting illumination requirements with the minimum amount of energy possible at the lowest lifecycle cost.
- Optimizing the environmental benefits of the program;
 - In addition to the environmental benefits of reduced energy use and reductions in greenhouse gas emissions associated with a well-designed LED conversion project, Ameresco is committed to proper recycling of the HPS lamps, including recovery of their mercury content, as well as the recycling of approximately 98% of the remainder of the HPS luminaires removed, including all metals and glass, and most plastic content.
- Minimizing future costs to maintain and replace the converted street lights;
 - We have addressed this goal through our selection of reliable, well-made LED luminaires from American Electric, our offer of a 10-year warranty, and the ROAM street light management system option.
- Obtaining accurate digital Geographic Information System (GIS) data for all targeted luminaires using Global Positioning System (GPS) technology;
 - We have extensive experience performing street light audits and are fully capable of obtaining accurate GIS data either during a pre-construction audit (updated with new luminaire data during installation), or during installation.
- Receiving electricity rebates from the utility companies;
 - We have provided our initial analysis of rebates available from APS and SRP for this project in our response. We have many years of experience working with utilities to secure the maximum possible rebates for our customers, including rebates from APS & SRP.

- **Obtaining warranty services throughout the term of the contract;**
 - We have provided all options requested in the RFP and these options are backed by both Ameresco and Acuity Brands, the largest lighting manufacturer in North America.
- **Achieving at or above the City's illumination standard based on spacing and height of pole.**
 - We are committed to meeting the City's illumination standards and to the degree desirable, exceeding them, while at the same time avoiding over lighting, light trespass and other negative consequences that could arise from exceeding the City's standards.
- **Maximizing the uniformity of light distribution on the City streets based on existing light pole spacing and luminaire mounting heights;**
 - We endorse and will meet the City's objective of maximizing uniformity of light distribution across a variety of different pole spacing and height configurations.
- **Street Lights would be replaced on arterial, collector, and local streets;**
 - We will accomplish this while minimizing disruptions to traffic and access to businesses and working with the City to communicate the benefits of the LED conversion to the public.
- **Identifying incremental costs and benefits of value-added options (e.g. wireless adaptive controls);**
 - We have extensive experience with wireless adaptive controls and have provided an extremely cost-effective solution in our response based on the RAOM system from Acuity Brands – the only system of its type in the US that is controlling more than 250,000 street lights.
- **Identifying the best financing model for the City of Phoenix.**
 - Our finance team has provided indicative financing costs utilizing a Tax Exempt Lease Purchase with a non-appropriation clause, and discussed other options in our response, including the use of a Qualified Energy Conservation Bond. We have secured more than \$1.2B in project financing and stand ready to assist in securing the best financing model for the City.

Ameresco is pleased to offer pricing compliant with the requirements of this RFP, in the format specified in the "Attachment A - LED Cost Proposal Template". Our pricing is presented in the subsequent pages in the following order:

- Attachment A. Ameresco – Energy Services Contract – 2700K Fixtures
- Attachment A. Ameresco – Energy Services Contract – 3000K Fixtures
- Attachment A. Ameresco – Energy Services Contract – 3500K Fixtures
- Attachment A. Ameresco – Energy Services Contract – 4000K Fixtures
- Addendum 1 to Attachment A. Ameresco – Energy Services Contract – 2700K Fixtures and ROAM Controls
- Addendum 1 to Attachment A. Ameresco – Energy Services Contract – 3000K Fixtures and ROAM Controls
- Addendum 1 to Attachment A. Ameresco – Energy Services Contract – 3500K Fixtures and ROAM Controls
- Addendum 1 to Attachment A. Ameresco – Energy Services Contract – 4000K Fixtures and ROAM Controls
- Addendum 2 to Attachment A. Guarantees

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Addendum 1 to Attachment A. ROAM Controls

> ROAM Wireless Monitoring & Control System

The Remote Operations Asset Management (ROAM) system from Acuity Brands is a proven wireless street light management and controls system with over 250,000 nodes deployed, including the City of Austin, TX (48,200 nodes), City of Glendale, AZ (20,000 nodes), and the Los Angeles Bureau of Street Lighting (55,000 nodes).

The ROAM system offers the City of Phoenix the opportunity to wirelessly monitor and control their street lighting system. The system is comprised of modules (nodes) that are attached to the ANSI 5- or 7-pin receptacle on the luminaire, which communicate with each other and with gateways to form a robust mesh network capable of bi-directionally transmitting the large quantities of data required for monitoring and controlling lighting system assets. Data from the gateways is transmitted to the Central Management System via a variety of backhaul options (wired, cellular, etc.).

The customer portal can be hosted by the City of Phoenix or at the Acuity Brands Network Operating Center in Conyers, GA, and there are different pricing plans for each of these options. For ease of implementation, Ameresco has included in our price the cost of remote hosting during the installation period. Street lights will be added to the ROAM system as they are installed and commissioned, and Ameresco will provide everything required for the system to be fully functional. During this twelve month period, the City will have an opportunity to evaluate continuing with the remote hosting option or acquiring the ROAM software and self-hosting. Our cost proposal includes all of the hardware associated with the ROAM system, including nodes for each luminaire and the required number of gateways to support those nodes, but does not include remote hosting beyond the installation period or the cost of acquiring the ROAM software and associated server hardware and licenses needed for self-hosting.

The following information provides a brief overview of the ROAM system and its capabilities:

Hardware

The ROAM System consists of two types of hardware:

- **Node:** A wirelessly enabled bi-directional photocontrol that is backwards compatible with streetlights featuring a NEMA 5 or 7 Pin receptacle.
- **Gateway:** A network backhaul device that transmits data collected at the node to the ROAM Network Operations Center (NOC)

A node resides on every luminaire that is to be monitored and controlled. The ROAM nodes are designed to be fixture agnostic, and can be installed on any fixture with a NEMA 5- or 7-pin receptacle. ROAM currently offers several different types of nodes tailored for typical lighting applications. They include a node for 120V to 277V systems, a 480V node, and a node designed for compatibility with

decorative post top fixtures. The ROAM nodes integrate with the 0-10V dimming driver in the LED luminaires via pins 4 and 5 on the NEMA receptacle to provide dimming control.

The nodes form a very robust mesh network of devices. These devices communicate through the mesh network to a gateway. The gateway is the backhaul device that collects and transmits all data to and from each node to a central server located either at a City of Phoenix site or at the ROAM Network Operations Center (NOC). The ROAM gateway can be configured for several backhaul methods including cellular and Ethernet (we have not included the cost of a cellular modem for each gateway).

Network

Upon installation, ROAM nodes and gateways form a robust Wide Area Network (WAN) capable of managing large quantities of data. Each node automatically seeks to communicate with other nodes in order to deliver business critical data to a gateway. Gateways are pre-configured to connect to the central server, and no network configuration is required. The communication packets between the gateway and the central server are encrypted using the AES algorithm, which has been approved by the NSA and is used by the United States Government.

Each ROAM device uses IEEE 802.15.4 standard protocols at 2.4 GHz to form a self-routing, self-healing mesh network with a device to device baud rate of 250kbits. Current deployments have demonstrated device to gateway ratios of 2000 to1, with emergency capacity capabilities of 5000 to 1. Communication packets within the mesh consist of custom data structures that use an encryption scheme based on the 3DES algorithm.

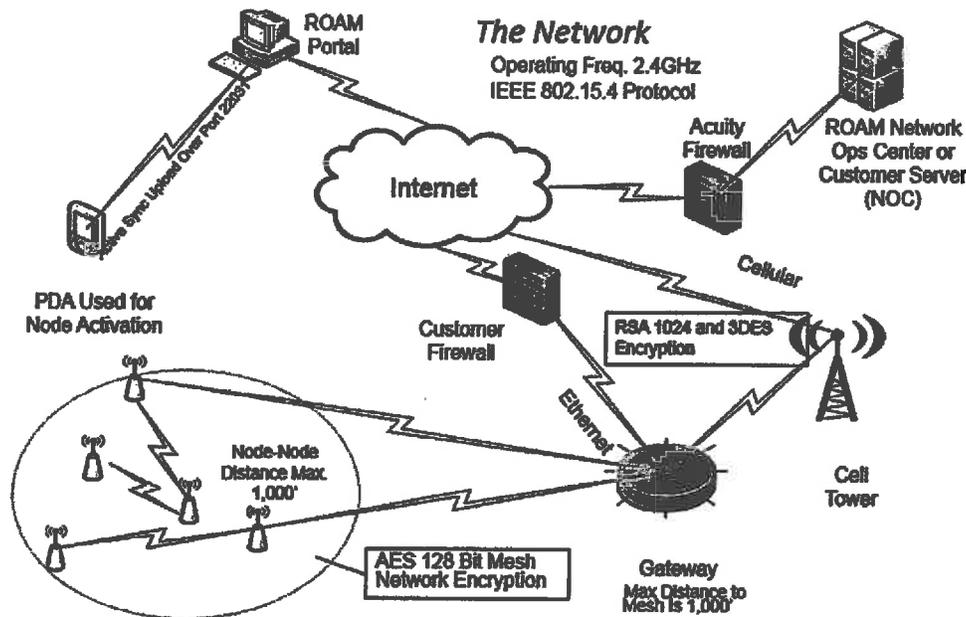


Figure D.0. ROAM Proprietary Mesh

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Most routing decisions are made at the node level, making the network extremely durable. The time to network restoration after a power outage is generally less than one minute. Immediate commands sent from the ROAM web portal to any device in the field should take no more than 10 seconds. The network uses two types of messages within the system; standard application data and message alarms. The standard application data propagates through the system on a set interval. These messages include all monitored data (such as power, voltage, operational status, etc.). Reporting intervals for all devices are adjustable. Message alarms are high priority messages that contain critical information (such as over current, over voltage, under voltage, etc.). Alarms propagate through the system in near real time. Command control messages are a type of alarm and also propagate through the system in near real time. All alarms can be set up to communicate with users via email, xml, pager, etc.

ROAM nodes are designed to continue operating in the event of network failure. If a device is on a schedule and a network failure occurs, the device will continue to execute the schedule. This is possible because each node has an internal clock. A node does experience drift over time (seconds per month) without connection to the network. Since the ROAM system reports non-communicating devices, such outages can be addressed well before any significant drift occurs. In the event of a system wide power outage resulting in a ROAM network outage, every ROAM node will operate as a photocontrol until it re-joins the network and obtains the NTP time stamp. Once a node has a time stamp, any schedule that may have been set will automatically be executed.

The ROAM hardware and network are completely scalable. Current deployments range from very small demonstration installations to large networks of over 50,000 devices. We do not anticipate any issues deploying ROAM for a street light system of 100,000 nodes or more, such as is required for Phoenix.

ROAM Customer Portal

The ROAM Portal gives lighting system operators the capability to wirelessly monitor and control their lighting system assets. The portal has been designed for ease of navigation and use while providing for maximum flexibility, operational input and control to the user. The ROAM Portal is available in two options; ROAM Concierge, is a web based centrally hosted system with no IT infrastructure requirements for the City of Phoenix. Concierge requires annual service fees to cover IT infrastructure and related services, as well as upgrades and remote technical support. ROAM Enterprise is available as a web based system hosted by the City of Phoenix with upgrades and technical support provided for an optional fee. Our recommended project includes ROAM Enterprise.

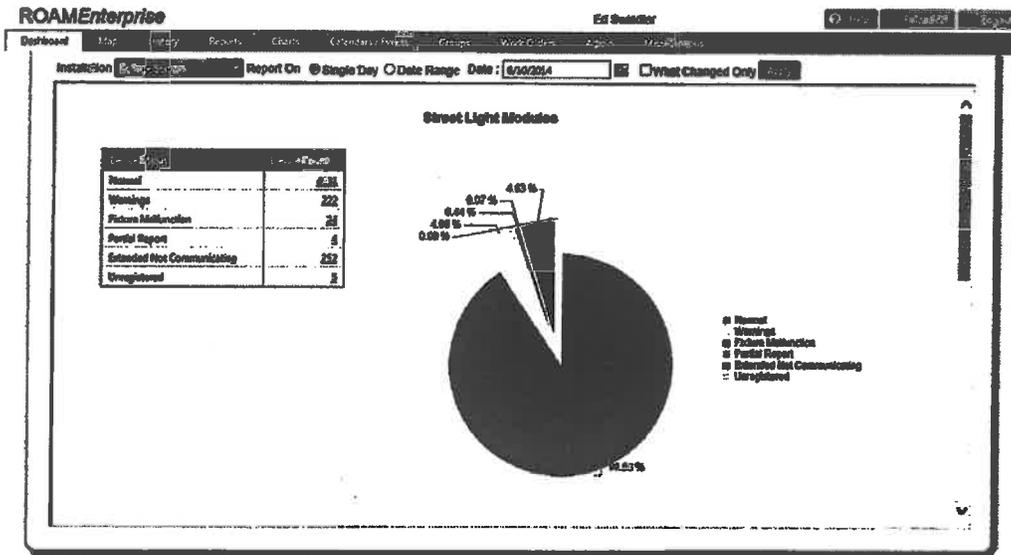
Information on the portal is displayed using the following views:

- Dashboard
- Maps
- Reporting
- History
- Grouping
- Scheduling
- Work Order Management

> Dashboard

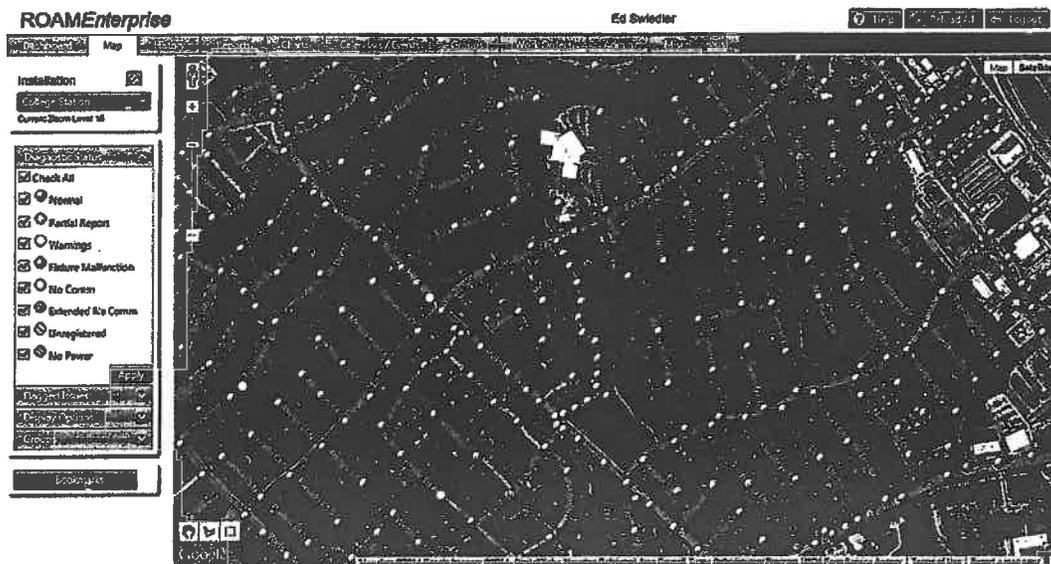
The Dashboard view provides the user with a summary level report that shows the status of all of the installed remote monitoring devices. The user is able to quickly determine the operational status of all lighting system assets, particularly those operating outside of “normal operating parameters”.

This view is intended to be an executive level report that can be exported or printed for presentation. Users are also able to interact with the screen and request additional details about the luminaries that are not operating correctly. This information includes basic details about the device, its location, and a seven day history of its activity. Users with the appropriate permission can also create work orders from this screen.



> Maps

The Map view provides a geographical representation of lighting system assets. Map images are provided by a mapping service that is running within the ROAM NOC and licensed from Google. The user is able to navigate around the map by panning, zooming and using predefined bookmarks to quickly locate their subject assets. The user is able to quickly determine which luminaires are operating normally and which ones are not based on icons used to represent each fixture. Annual fees for Google mapping updates are included in the centrally hosted system annual fees. Mapping updates for the user hosted system are the responsibility of the end-user.



By placing the mouse over a specific fixture, the user will view asset attributes as well as any additional detail pertaining to its operating status.

- Move
- Activity for yesterday
- Chart for yesterday
- Status for past 30 days
- Chart for past 30 days
- Burn Information for past 30 days
- Edit device
- Notes
- Groups
- Meter Data
- Delete Device

Depending on the permission granted to the user, they may be able to perform additional actions from the mapping screen, such as: Relocating a fixture, adding and viewing notes about a fixture, viewing and editing the attributes collected about the fixture during activation, issuing immediate commands to the fixture and creating work orders. Users that have the appropriate permissions are able to issue the following immediate commands:

- Turn On
- Turn Off
- Return-to-Normal Operation (Photocontrol)
- Dim

When issuing a Turn on or Turn off command the user is required to enter time duration, not to exceed a single day. When issuing a Dimming command, the user must enter both time duration and dimming level (0-100). These commands are immediately issued to the device and the result of these commands can be viewed from the portal. Regardless of other permissions granted, all users have read only access to the information on the portal.

> History

The History view provides a user the ability to see the operational history of the luminaires over either a seven day or thirty day time frame. The user has access to multiple filters which allow them to focus on specific assets and operational conditions. From this screen, the user will be able to drill down into the data for any day and see the hourly data collected from the device in report or graphical format. Users with the appropriate permissions have the ability to create work orders from this screen as well.

Installation: Selected Date:

Number of days: 7 30 Occurs (optional): On Selected Date At least 3 times Any time

Asset ID	Pole	Latitude	Longitude	Street Address	W/O	Lamp Type	4/6	4/7	4/8	4/9	4/10	4/11	4/12
48246	16	32.61927	-117.00282	Heritage Rd	No	LED-140	135	135	135	135	135	135	135
48248	8	32.62250	-117.00351	Heritage Rd	No	LED-140	135	135	135	134	135	135	135
48250	13	32.62023	-117.00360	Heritage Rd	No	LED-140	135	135	135	135	135	135	135
48252	18	32.62028	-117.00356	Heritage Rd	No	LED-140	135	135	134	134	134	134	134
48254	7	32.62250	-117.00282	Heritage Rd	No	LED-140	134	134	134	134	134	134	134
48256	1	32.62074	-117.00378	Heritage Rd	No	LED-140	135	135	135	135	135	135	135
48258	9	32.62204	-117.00353	Heritage Rd	No	LED-140	134	133	133	135	133	133	133
48260	3	32.62147	-117.00457	Heritage Rd	No	LED-140	135	135	135	135	135	135	135
48262	6	32.62302	-117.00634	Heritage Rd	No	LED-140	134	134	134	134	134	134	134
48264	17	32.61945	-117.00322	Heritage Rd	No	LED-140	137	137	136	137	136	136	136
48266	12	32.62093	-117.00441	Heritage Rd	No	LED-140	136	136	136	136	136	136	136
48268	11	32.62117	-117.00482	1267-1275 E Pelamar St	No	LED-140	135	135	135	135	135	135	135
48270	10	32.62181	-117.00335	Heritage Rd	No	LED-140	134	133	133	133	133	133	134
48272	5	32.62253	-117.00376	Heritage Rd	No	LED-140	135	135	135	134	135	135	135
48274	14	32.61982	-117.00327	Heritage Rd	No	LED-140	135	135	135	135	135	135	135

Activity on 4/22/2014 for: 49F84 Normal

Street Light Dimmer
 Data Reports Lamp Events

Time	Relay State	Light Level	Average Wattage	Average Voltage	Minimum Voltage	Maximum Voltage	V-Defn
00:00	Closed	6	135	238	238	240	2
01:00	Closed	2	135	238	238	240	2
02:00	Closed	4	135	238	238	238	0
03:00	Closed	2	135	238	236	238	2
04:00	Closed	2	135	238	238	238	0
05:00	Closed	2	135	237	236	238	2
06:00	Closed	51	135	238	236	238	2
07:00	Open	1023	52	238	236	240	4
08:00	Open	1023	0	240	238	242	4
09:00	Open	1023	0	241	240	242	2

> Reporting

The reporting view offers the user multiple reports and graphs that can be used to monitor the ROAM enabled luminaries. All reports use a common interface and can be easily exported to Excel, PDF or XML formats. Of particular interest is the Daily Status report. It gives permissioned users a high level of flexibility in viewing and managing their ROAM enabled luminaries through exportable reports. A user is able to interact with the devices listed on any of the reports to view additional details or to see the device on the map. Users with the appropriate permissions have the ability to create work orders from this screen as well.

Installation: [] Month: April 2014

Luma Type	Voltage	Fixtures	Run Hours	KWH
HPS	100	2,463	437,881,348	55,503,043
HPS	200	1,366	211,820,472	52,283,899
HPS	250	69	10,853,413	1,124,771
HPS	400	888	120,521,210	51,683,741
IND	70	1	0.000	0.000
IND	100	1	179,567	23,688
LED	40	1	176,567	20,524
LED	50	3	532,700	37,003
LED	70	33	7,648,510	488,164
LED	80	1	383,517	13,810
LED	100	1	175,433	23,195
LED	150	8	1,808,634	258,084
LED	250	108	14,564,122	3,757,088
MH	70	3	465,000	42,393
MH	100	489	75,131,287	2,422,804
		5,428	886,148,926	178,668,978

Page size: 20 21 items in 1 page

> Grouping

The ROAM Portal also includes a grouping feature which allows a user to define a subset of remote devices and store them under a named group. Information about the status of the devices within a group is presented in a format similar to the Dashboard view. Users are able to add and remove devices from a group as needed. These groups may be used in various other ways throughout the ROAM system, such as:

- Report and historical data filters
- Creation of schedules and events
- Issuing immediate commands

> Scheduling

The ROAM Portal also provides for the scheduling of commands to be issued to the remotely controlled devices. A user is able to define and issue both a schedule (covering one or more weeks) as well as events (covering one or more days, consecutive or otherwise). Both schedules and events are issued to groups that have been defined on the Grouping screen. Schedules allow the user to define four time intervals each day to affect the operational status of the device. The user also has the ability to set time intervals based on sunrise and sunset offsets to assist with energy savings. Events are used when there is a need to exercise more control for a specific date or a recurring event. In this case, the user is able to select up to 8 specific times to affect the operational status of the device. In order of priority, an Event will always take priority over a Schedule so it is possible to have both a Schedule and an Event on the same date.

> Work Order Management

The ROAM portal contains a full-featured Work Order Management module that enables users to create work orders for specific fixtures. Use of this module helps to drive asset performance, reduce repair time, and improve customer satisfaction levels of citizens. ROAM's Work Order Management Module includes the following key features:

- Create work orders from virtually any screen on the portal
- Assign work directly to crews or to crew coordinators
- User-definable repair procedures
- Record and track parts used in repairs
- Track repair dates
- Work orders are printed and can then be completed using bar codes and/or touch screen entry on the handheld
- Work orders can be exported in XML format so they can be integrated into other software applications
- Work order tickets provide operating details to assist field performers in troubleshooting
- System verification and completion of work orders

> **Monitoring, Reporting and Diagnostics**

ROAM diagnoses the operational status of each fixture based on a 24 hour duty cycle. The following operational characteristics are diagnosed and reported through the ROAM customer portal:

> **Remote Monitoring and Diagnostics**

- Fixture Malfunction
- Cycling
- Day-Burner
- Unspecified Malfunction
- No Communication
- No Power
- Low System Voltage
- High System Voltage
- High V Delta
- Low Wattage
- Excessive Power Use
- Fixture on a Group Control
- 120V PC on a 240V Fixture
- Power Factor

> **Reports**

- Fixture Status
- Average, Max and Min Power for Each Reporting Interval (typically 1 hour)
- Energy Tracking (KWH reports)
- Burn Hour Report
- Average Line Voltage
- Minimum Line Voltage
- Maximum Line Voltage
- Light Sensor Reading

> **Events/Alerts**

- On/Off Transition Alerts
- Low Voltage Alert (<103V)
- High Voltage Alert (>305V)
- Excessive Current Alert (>14A)
- Improperly Wired Fixture

System Upgrades

Upgrades to the ROAM customer portal, nodes and gateways occur periodically and are intended to improve the functionality and robustness of the system. Upgrades are included as part of the centrally hosted system's ongoing service fees and are performed by ROAM personnel.

For the user hosted ROAM Enterprise system, we have recommended portal upgrades that can be purchased from ROAM on a version specific basis. If necessary, any node and gateway firmware updates can be performed over the air, through a ROAM provided executable file that the end-user can run to perform the upgrade.

Password Administration

Access to various portal functions is controlled by user ID permission levels for the ROAM Enterprise system. The City of Phoenix would be responsible for password administration.

Addendum 2 to Attachment A. Guarantees

> Energy Savings Guarantee

If selected under the Energy Savings Contract (ESC) option, Ameresco will provide an energy savings guarantee which meets the requirements of Arizona Revised Statute; Title 34-105, Guaranteed energy cost savings contracts. Based on the scope of work detailed in the RFP, Ameresco projects the ability to provide a guarantee on 95% of the projected energy savings.

There are different ways to verify the energy savings that occur from installing new LED luminaires. Ameresco utilizes both the International Performance Measurement and Verification Protocol (IPMVP) as well as the measurement and verification protocols published in the Federal Energy Management Program (FEMP). The different measurement and verification methods will be covered with the City in detail during the Investment Grade Audit process. In order to optimize the value of the guarantee as part of the scope of work contemplated in the RFP, Ameresco contemplates providing a guarantee of the performance of the new fixtures. During installation Ameresco will verify the performance of a statistical sample of the new luminaires to verify that they are operating within the parameters defined by the manufacturer in the luminaire cut sheets. The statistical sample will produce a 90% confidence and 10% relative precision. The baseline wattage of the existing luminaires and the total annual operating hours will be stipulated as the values provided in the RFP. Should this performance testing reveal a shortfall in savings, Ameresco will either; repair or replace the defective luminaires before construction is complete, install additional retrofits at Ameresco's expense in order to achieve the guaranteed savings, or reimburse the City the shortfall amount.

The City will also be able to select the length of time that the savings guarantee is in place. Arizona Revised Statute; Title 34-105 requires that the ESCO provide a guarantee for the length of the financing term. Longer term guarantees can be provided if desired by the City. Selecting a longer guarantee period can also benefit the City if there are problems with luminaires after the warranty period has expired. We are able to leverage our national buying power to help our customers with problems that arise shortly after the warranty period ends. The specifics of the final measurement and verification plan and any associated costs will be discussed in detail with the City before the construction process begins.

> Project Cost Guarantee

Ameresco will guarantee the final project cost that is determined at the end of the Investment Grade Audit process. Ameresco will be 100% responsible for the accuracy of the Investment Grade Audit, including quantities of luminaires. Should we discover additional luminaires during the course of construction, Ameresco will be responsible for replacing those luminaires at no cost to the City. This guarantee as well as the energy savings guarantee, we believe, are the major differentiators between the Capital Purchase process and the Energy Savings Contract. The City will need to issue a change order

to retrofit any additional fixtures above the 96,428 identified in the RFP under a Capital Purchase contract. Whereas under the Energy Savings Contract, Ameresco will be responsible for all inaccuracies post completion of the Investment Grade Audit.

Appendices

The following appendices have been included, as requested in Request for Proposal 63-0022, Energy Saving Street Light Conversion Project.

- Appendix A. Resumes
- Appendix B. Luminaire Specification Sheets
- Appendix C. LED Driver Specification Sheets
- Appendix D. LM-79 Luminaire Photometric Report
- Appendix E. In-Situ Test Data
- Appendix F. LM-80 Lumen Maintenance Report
- Appendix G. TM-21 Calculations
- Appendix H. Backlight, Uplight, Glare (BUG) Rating
- Appendix I. IES Chromaticity Data
- Appendix J. Computer Generated Point by Point Photometric Analysis
- Appendix K. IES Photometric Reports
- Appendix L. Written Product Warranty
- Appendix M. Instructions for Installation and Maintenance
- Appendix N. Technical Specifications for LED Luminaires (*electronic only*)
- Appendix O. Data and Performance Spreadsheets (*electronic only*)
- Appendix P. Signed Addenda
- Appendix Q. Proposal from Banc of America Public Capital Corp to Ameresco for Qualified Tax-Exempt Equipment Lease/Purchase Agreement
- Appendix R. Required Forms and Insurance Submittals
- Appendix S. Request for Consideration of Alternate Terms (attachment to the submittal)

Appendix A. Resumes

Resumes of the key personnel that will be assigned to the Ameresco City of Phoenix Team have been included in Appendix A and provide representative experience specifically related to the Scope of Work. For ease of navigation, resumes have been included in the order shown in Table A.5. Proposed Ameresco City of Phoenix Team.

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Appendix B. Luminaire Specification Sheets

Specification sheets for each luminaire (A through E) have been included herein. For ease of navigation, proposed luminaires have been grouped by each correlated color temperature (2,700K, 3,000K, 3,500K and 4,000K) in the table below and specification sheets for each luminaire catalog number provided. Additionally, Appendix B includes specification sheets for the photocontrols.

Luminaire Catalog Number	Luminaire @ 2,700K					Luminaire @ 3,000K					Luminaire @ 3,500K					Luminaire @ 4,000K					
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
ATBS D MVOLT R3	X					X					X										
ATBS E MVOLT R2		X																			
ATBM B MVOLT R2			X																		
ATBL A MVOLT N2				X					X												
ATB2 80BLEDED MVOLT T1S					X					X					X						X
ATBS D MVOLT R2							X					X									
ATBS I MVOLT R2								X					X						X		
ATBL A1 MVOLT N2														X							X
ATBS C MVOLT R3																X					
ATBS C MVOLT R2																	X				

> Luminaire Specification Sheets

- ATBS Series Luminaires
 - ATBS D MVOLT R3
 - ATBS E MVOLT R2
 - ATBS D MVOLT R2
 - ATBS I MVOLT R2
 - ATBS C MVOLT R3
 - ATBS C MVOLT R2
- ATBM Series Luminaires
 - ATBM B MVOLT R2
- ATBL Series Luminaires
 - ATBL A MVOLT N2
 - ATBL A1 MVOLT N2
- ATB2 Series Luminaires
 - ATB2 80BLEDED MVOLT T1S
- AcuityControls DLL Elite Electronic Locking Type Photocontrol

Appendix C. LED Driver Specification Sheets

LED driver specification sheets for each of the proposed luminaires have been included herein.

> LED Driver Specification Sheets

- **ATBS Series Luminaires**
 - ATBS D MVOLT
 - ATBS E MVOLT
 - ATBS I MVOLT
 - ATBS C MVOLT

- **ATBM Series Luminaires**
 - ATBM B MVOLT

- **ATBL Series Luminaires**
 - ATBL A MVOLT
 - ATBL A1 MVOLT

- **ATB2 Series Luminaires**
 - ATB2 80BLEDED MVOLT

Appendix D. LM-79 Luminaire Photometric Report

LM-79 luminaire photometric reports for the recommended LED replacement luminaires have been included herein.

> LM-79 Luminaire Photometric Report

- **ATBS Series Luminaires**
 - ATBS D MVOLT R3
 - ATBS E MVOLT R2
 - ATBS D MVOLT R2
 - ATBS I MVOLT R2
 - ATBS C MVOLT R3
 - ATBS C MVOLT R2

- **ATBM Series Luminaires**
 - ATBM B MVOLT R2

- **ATBL Series Luminaires**
 - ATBL A MVOLT N2
 - ATBL A1 MVOLT N2

- **ATB2 Series Luminaires**
 - ATB2 80BLEDED MVOLT T1S

Appendix E. In-Situ Test Data

IN-situ test data confirming the thermal operating temperatures of each of the proposed luminaires have been included herein.

> In-Situ Test Data

- ATBS Series Luminaires
 - ATBS D MVOLT
 - ATBS E MVOLT
 - ATBS I MVOLT
 - ATBS C MVOLT
- ATBM Series Luminaires
 - ATBM B MVOLT
- ATBL Series Luminaires
 - ATBL A MVOLT
 - ATBL A1 MVOLT
- ATB2 Series Luminaires
 - ATB2 80BLEDED MVOLT

Appendix F. LM-80 Lumen Maintenance Report

LM-80 Lumen Maintenance Reports for each proposed luminaires have been included herein.

> LM-80 Lumen Maintenance Reports

- **ATBS Series Luminaires**
 - ATBS D MVOLT
 - ATBS E MVOLT
 - ATBS I MVOLT
 - ATBS C MVOLT

- **ATBM Series Luminaires**
 - ATBM B MVOLT

- **ATBL Series Luminaires**
 - ATBL A MVOLT
 - ATBL A1 MVOLT

- **ATB2 Series Luminaires**
 - ATB2 80BLEDED MVOLT

Appendix G. TM-21 Calculations

TM-21 calculations, as defined in the City of Phoenix specification, have been included herein. Each TM-21 Report shows the drive current used for the submitted luminaire.

> TM-21 Reports

- ATBS Series Luminaires
 - ATBS D MVOLT
 - ATBS E MVOLT
 - ATBS I MVOLT
 - ATBS C MVOLT

- ATBM Series Luminaires
 - ATBM B MVOLT

- ATBL Series Luminaires
 - ATBL A MVOLT
 - ATBL A1 MVOLT

- ATB2 Series Luminaires
 - ATB2 80BLEDED MVOLT

Appendix H. Backlight, Uplight, Glare (BUG) Rating

The Backlight, Uplight, Glare (BUG) rating for each of the proposed luminaires has been provided below:

Luminaire Data @ 2,700K

Luminaire	Catalog Number	Backlight	Uplight	Glare
Luminaire A	ATBS D MVOLT R3	1	0	1
Luminaire B	ATBS E MVOLT R2	1	0	1
Luminaire C	ATBM B MVOLT R2	1	0	2
Luminaire D	ATBL A1 MVOLT N2	3	0	3
Luminaire E	ATB2 80BLEDED MVOLT T1S	3	0	3

Luminaire Data @ 3,000K

Luminaire	Catalog Number	Backlight	Uplight	Glare
Luminaire A	ATBS D MVOLT R3	1	0	1
Luminaire B	ATBS D MVOLT R2	1	0	1
Luminaire C	ATBS I MVOLT R2	2	0	2
Luminaire D	ATBL A1 MVOLT N2	3	0	3
Luminaire E	ATB2 80BLEDED MVOLT T1S	3	0	3

Luminaire Data @ 3,500K

Luminaire	Catalog Number	Backlight	Uplight	Glare
Luminaire A	ATBS D MVOLT R3	1	0	1
Luminaire B	ATBS D MVOLT R2	1	0	1
Luminaire C	ATBS I MVOLT R2	2	0	2
Luminaire D	ATBL A1 MVOLT N2	3	0	3
Luminaire E	ATB2 80BLEDED MVOLT T1S	3	0	3

Luminaire Data @ 4,000K

Luminaire	Catalog Number	Backlight	Uplight	Glare
Luminaire A	ATBS C MVOLT R3	1	0	1
Luminaire B	ATBS C MVOLT R2	1	0	1
Luminaire C	ATBS I MVOLT R2	2	0	2
Luminaire D	ATBL A1 MVOLT N2	3	0	3
Luminaire E	ATB2 80BLEDED MVOLT T1S	3	0	2

Appendix I. IES Chromaticity Data

IES chromaticity data from an LED Lighting Facts approved testing laboratory has been provided for each of the proposed luminaires herein.

- > Lumileds, DS115 LUXEON CoB Core Range Product Datasheet
 - ATBS Series Luminaires
 - ATBS D MVOLT R3
 - ATBS E MVOLT R2
 - ATBS D MVOLT R2
 - ATBS C MVOLT R3
 - ATBS C MVOLT R2

- > CITELED COB Series High-CRI Type On B.B.L.Model, CLU046-1812C1
 - ATBS I MVOLT R2

- > NICHIA Corporation Specifications for Warm White LED, NFCLL060B
 - ATBM B MVOLT R2

- > Cree® XLamp® XP-L LEDs
 - ATBL A MVOLT N2

- > Cree® XLamp® XP-L White LEDs
 - ATBL A1 MVOLT N2

- > NICHIA Corporation Specifications for Warm White LED, NVSL219CT
 - ATB2 80BLEDED MVOLT T1S

Appendix J. Computer Generated Point by Point Photometric Analysis

Computer generated point by point analyses for each of the luminaire type (A through D) have been included herein.

Appendix K. IES Photometric Reports

IES photometric reports for the proposed luminaires have been provided herein. IES electronic files have been included on each of the two (2) flash drives submitted as part of this proposal.

Luminaire Catalog Number	Luminaire @ 2,700K					Luminaire @ 3,000K					Luminaire @ 3,500K					Luminaire @ 4,000K					IES filename
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
ATBS D MVOLT R3	X					X					X										ATBS D XXXXX R3.ies
ATBS E MVOLT R2		X																			ATBS E XXXXX R2.ies
ATBM B MVOLT R2			X																		ATBM B XXXXX R2.ies
ATBL A MVOLT N2				X					X												ATBL A1 XXXXX N2 27K.ies ATBL A1 XXXXX N2 3K.ies
ATB2 80BLEDED MVOLT T1S				X					X					X						X	ATB2 80BLEDE10 XXXXX T1S 3K.ies ATB2 80BLEDE10 XXXXX T1S 4K.ies
ATBS D MVOLT R2							X					X									ATBS D XXXXX R2.ies
ATBS I MVOLT R2								X					X					X			ATBS I XXXXX R2 3K.ies ATBS I XXXXX R2.ies
ATBL A1 MVOLT N2													X						X		ATBL A1 XXXX N2 35K.ies ATBL A1 XXXX N2.ies
ATBS C MVOLT R3																	X				ATBS C XXXXX R3.ies
ATBS C MVOLT R2																	X				ATBS C XXXXX R2.ies

Appendix L. Written Product Warranty

Written product warranties for the proposed LED luminaires, photocontrols and ROAM controls have been included herein.

- **Statement of Limited Warranty for Acuity Brands Lighting, Inc.
LED Outdoor Commercial Products**
- **Statement of Limited Warranty for Acuity Brands Lighting, Inc.
d/b/a Dark to Light Commercial Controls**
- **Statement of Limited Warranty for Acuity Brands Technology
Services, Inc. d/b/a ROAM Commercial Controls**

Appendix M. Instructions for Installation and Maintenance

Instructions for installation and maintenance of the proposed luminaires have been included herein.

Luminaire Catalog Number	Luminaire @ 2,700K					Luminaire @ 3,000K					Luminaire @ 3,500K					Luminaire @ 4,000K				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
ATBS D MVOLT R3	X					X					X									
ATBS E MVOLT R2		X																		
ATBM B MVOLT R2			X																	
ATBL A MVOLT N2				X					X											
ATB2 80BLEDED MVOLT T1S					X					X					X					X
ATBS D MVOLT R2							X					X								
ATBS I MVOLT R2								X					X					X		
ATBL A1 MVOLT N2														X						X
ATBS C MVOLT R3																X				
ATBS C MVOLT R2																	X			

> Luminaire Series

- ATBS Series Luminaires
- ATBM Series Luminaires
- ATBL Series Luminaires
- ATB2 Series Luminaires
 - ATBO Light Trespass Shield

Appendix N. Technical Specifications for LED Luminaires

Per Section E. Minimum Required Submittals for the Proposed LED Luminaires on pages 95 and 96 of the Request for Proposal, Microsoft Word versions of the technical specifications for the proposed LED luminaires has been included on two (2) flash drives, enclosed as part of this submittal package.

On each of the proposed technical specifications, Ameresco has identified in yellow where the luminaire is shown to be in compliance with the minimum specification.

Luminaire Catalog Number	Luminaire @ 2,700K					Luminaire @ 3,000K					Luminaire @ 3,500K					Luminaire @ 4,000K				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
ATBS D MVOLT R3	X					X					X									
ATBS E MVOLT R2		X																		
ATBM B MVOLT R2			X																	
ATBL A MVOLT N2				X					X											
ATB2 80BLEDED MVOLT T1S					X					X					X					X
ATBS D MVOLT R2							X					X								
ATBS I MVOLT R2								X					X					X		
ATBL A1 MVOLT N2														X						X
ATBS C MVOLT R3																X				
ATBS C MVOLT R2																	X			

Appendix O. Data and Performance Spreadsheets

Per Section E. Minimum Required Submittals for the Proposed LED Luminaires on pages 95 and 96 of the Request for Proposal, Microsoft Excel versions of the data and performance spreadsheets for each luminaire (A through E) at each correlated color temperature (2,700K, 3,000K, 3,500K and 4,000K) has been included on two (2) flash drives, enclosed as part of this submittal package.

Luminaire Catalog Number	Luminaire @ 2,700K					Luminaire @ 3,000K					Luminaire @ 3,500K					Luminaire @ 4,000K				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
ATBS D MVOLT R3	X					X					X									
ATBS E MVOLT R2		X																		
ATBM B MVOLT R2			X																	
ATBL A MVOLT N2				X					X											
ATB2 80BLEDED MVOLT T15					X					X					X					X
ATBS D MVOLT R2							X					X								
ATBS I MVOLT R2								X					X					X		
ATBL A1 MVOLT N2														X					X	
ATBS C MVOLT R3																X				
ATBS C MVOLT R2																	X			

Appendix P. Signed Addenda

Per the requirements of Request for Proposal 63-0022, Section IV – Instructions to Proposers, Ameresco acknowledges and has signed the following Addenda:

- Addendum 1, issued May 6, 2016
- Addendum 2, issued May 13, 2016
- Addendum 3, issued May 27, 2016



**City of Phoenix
Street Transportation Department**

**RFP 63-0022: Energy Saving Street Light Conversion Project
ADDENDUM NO. 1
Issued May 6, 2016**

CORRECTIONS AND CLARIFICATIONS

- C1: The deadline for all inquiries is Friday, May 13, 2016, by noon.**
 - C2: Total available points for the Capital Purchase evaluation process is 1000.**
 - C3: Evaluation Factor Project Finance Term Guarantee – Up to 200 pts. Has been replaced with Project Financing Term – Up to 150 pts.**
-

SIGNATURE OF RECEIPT

The signing and submitting of this page hereby acknowledges receipt of Addendum No. 1 for RFP 63-0022, City of Phoenix Energy Saving Street Light Conversion Project.

This signature page must be signed and submitted as part of the RFP proposal submittal.

Signature

A handwritten signature in black ink, appearing to be "D. Smith".

Date May 6, 2016



**City of Phoenix
Street Transportation Department**

**RFP 63-0022: Energy Saving Street Light Conversion Project
ADDENDUM NO. 2
Issued May 13, 2016**

A49: Can the City please provide exact inventory quantities for street lights by each utility (SRP, APS)? Attachments F and G do not match up to the inventory quantities provided in the RFP

A49: The City of Phoenix does not have an exact inventory of quantities. Numbers provided throughout this process are estimates.

CORRECTIONS, CLARIFICATIONS, OTHER INFORMATION

C1: The most recent GIS information on our streetlight network is posted to our procurement webpage. Please note the data is in excess of 14,000 pages.

C2: The City of Phoenix acknowledges that there is a more formal/technical industry use of the term ESCO, but our usage of the word is not be the same as the definition provided by the State of Arizona or the Federal government. Therefore, the City is providing this additional clarification.

The use of the phrase "Energy Services Contract" for the purposes of the Request for Proposals is intended to mean any proposed offer that includes at a minimum the supply, installation, and continued maintenance of LED lights. Proposals may include as an add-on adaptive controls or any other innovations (i.e. shared savings) that would be in the best interest of the City of Phoenix,

The use of the phrase "Other Financing Options," includes those proposals which seek to finance the purchase of the LED lights on behalf of the city, if the City was to recommend a vendor under the Capital Purchase Only scenario.

SIGNATURE OF RECEIPT

The signing and submitting of this page hereby acknowledges receipt of Addendum No. 2 for RFP 63-0022, City of Phoenix Energy Saving Street Light Conversion Project.

This signature page must be signed and submitted as part of the RFP proposal submittal.



City of Phoenix
Street Transportation Department

RFP 63-0022: Energy Saving Street Light Conversion Project
ADDENDUM NO. 2
Issued May 13, 2016

Signature *Janet Pitt*

Date 5/13/2016



City of Phoenix
Street Transportation Department

RFP 63-0022: Energy Saving Street Light Conversion Project
ADDENDUM NO. 3
Issued May 27, 2016

SIGNATURE OF RECEIPT

The signing and submitting of this page hereby acknowledges receipt of Addendum No. 2 for RFP 63-0022, City of Phoenix Energy Saving Street Light Conversion Project.

This signature page must be signed and submitted as part of the RFP proposal submittal.

Signature *Paul Holt*

Date 5/27/2016

Appendix Q. Proposal from Banc of America Public Capital Corp to Ameresco for Qualified Tax-Exempt Lease/Purchase Agreement

Bank of America 
Merrill Lynch

Michael C. Brunzman
Senior Vice President
Energy Services

Banc of America Public Capital Corp
312 Walnut Street, Ste 2200
Cincinnati, OH 45202
michael.brunzman@bamf.com
Tel: (513) 929-5102
Fax: (312) 453-6331

June 9, 2016

City of Phoenix
Street Transportation Department
200 W Washington Street, 5th Floor
Phoenix, AZ 85003

Care of: Tim Farkas, Ameresco

Re: Approximately \$25,023,008 Non-Bank Qualified Tax-Exempt Equipment Lease/Purchase Agreement

Banc of America Public Capital Corp ("**BAPCC**") is pleased to submit to City of Phoenix (the "**Lessee**") Non-Bank Qualified Tax-Exempt Equipment Lease/Purchase Agreement proposal (the "**Proposed Transaction**") as described in the attached Summary of Terms and Conditions (the "**Term Sheet**"). Please review the Term Sheet and contact me if you have any questions.

This letter and the Term Sheet (collectively, the "**Proposal**" or the "**Proposal Letter**") include only a brief description of the principal terms of the Proposed Transaction, and are intended for discussion purposes only. Please understand that this Proposal is not a commitment or offer to purchase, and does not create any obligation for BAPCC. BAPCC will not be responsible or liable for any damages, consequential or otherwise, that may be incurred or alleged by any person or entity as a result of this Proposal Letter. BAPCC will notify you in writing of its decision to proceed with the Proposed Transaction after completing its review and analysis. If BAPCC agrees to proceed with the Proposed Transaction, BAPCC would submit to you an offer to purchase that, upon acceptance by the Lessee, would constitute a binding written contract between BAPCC and the Lessee with respect to the Proposed Transaction, as more fully described in the Proposal.

This Proposal must be accepted on or before June 27, 2016, in order for the BAPCC to proceed with its consideration of the Proposed Transaction. To accept this Proposal, please sign the enclosed copy of this Proposal Letter and return it to my attention at Banc of America Public Capital Corp, 312 Walnut Street, Ste 2200, Cincinnati, Ohio 45202, (513) 453-5331 fax.

Thank you for allowing us the opportunity to prepare this Proposal for City of Phoenix.

Very truly yours,

Banc of America Public Capital Corp

Michael C. Brunzman

By: Michael C. Brunzman
Title: Senior Vice President

The undersigned, by its authorized representative below, accepts the above Proposal, agrees to furnish BAPCC, its successors and assigns, any information relating to the business or financial condition of the Lessee or its affiliates, and authorizes the BAPCC, Bank of America, N.A. and their affiliates to disclose to, discuss with and distribute such information (and any information they may already have) to any other affiliates or proposed assignees or successors of BAPCC.

City of Phoenix

By: _____

Title: _____

Date: _____

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SUMMARY OF TERMS AND CONDITIONS

Date: June 9, 2015

Lessee: City of Phoenix

Lessee's Outside Counsel: To Be Determined

Lessor: Banc of America Public Capital Corp, or one of its affiliates

Lessor Counsel: Chapman and Cutler

Escrow Agent: Bank of America, N.A.

Purpose: The purpose of this transaction is to provide financing for the conversion of approximately 90,000 street lights to LED technology.

Structure: Nature Of Payment Obligation:

This transaction will be structured as a Non-Bank Qualified Tax-Exempt Equipment Lease/Purchase Agreement (the "Agreement") between the Lessee and the Lessor

The obligation to make Rental Payments under the Agreement shall be an annual appropriation obligation of the Lessee payable from any lawfully available funds. Regardless of the status of installation or performance of the Equipment, the Lessee's obligation to make payments commence on that certain date as set forth in the Agreement. Legal title to the Equipment shall be vested in the Lessee. The Agreement will be a net financial contract of the Lessee, and all expenses (including, but not limited to, insurance, maintenance, and taxes) will be for the account of the Lessee.

Without limiting the generality of the foregoing, Lessee shall not be entitled to any abatement of rent or reduction thereof or setoff against rent, including, but not limited to, abatements, reductions or setoffs due to any present or future claims of Lessee against Ameresco under the Performance Contract or against Lessor under this Agreement or otherwise.

Escrow:

At closing, proceeds from the Agreement will be deposited into an Escrow Account established pursuant to an Escrow and Account Control Agreement (the "Escrow") by and among the Lessee, the Lessor and the Escrow Agent. The Escrow Agent will be selected by the Lessee, subject to the Lessor's approval. The Lessor has an arrangement with Bank of America, N.A., under which escrow agent services for these types of transactions are provided at no charge to Lessee. During the installation period, the Lessee will requisition funds in the manner outlined in the Escrow. No funds will be disbursed without the written approval of the Lessee and approval of the Lessor. The Lessee will direct the investments

in the Escrow Account and all interest earnings will accrue to the Lessee's benefit.

Security: Lessor's security interest in the Equipment will be evidenced by filing of a UCC-1 Financing Statement (personal property) with respect to the Equipment. Lessor will also have a security interest in any unexpended funds in the Escrow.

Financed Amount: Approximately \$25,023,008

Agreement Term: Commencement Date: Projected to be September 30, 2016.

Agreement Term: For purposes of this Proposal, the Agreement Term is approximately 10.5 years from the Commencement Date.

Indicative Interest Rate: 1.79% NBQ

The Indicative Interest Rate was calculated as shown in the table below:

Swap	Swap Index	*0.65	+Spread	Tax-Exempt Rate
6-year	1.30%	0.85%	0.94%	1.79%

As of June 8, 2016, the 6-year Treasury Interest Rate Swap as reported by Bloomberg was 1.30%.

~~Once Lessee is prepared to execute this Proposal, the rate can be locked for a period of up to 180 days.~~ For example, if the Lessee decided to lock in the rate on June 30 for a period of 90 days (through September 30, 2016), and the 6-year Swap on June 30 was 1.40%, the locked Interest Rate would be calculated as follows:

Swap	Swap Index	*0.65	+Spread	+Rate Lock Cost	Tax-Exempt Rate
6-year	1.40%	0.91%	0.94%	0.05%	1.90%

Submission for Credit Approval:

If the Lessee accepts this Proposal, the transaction will be submitted to Lessor's credit and management for approval. The Lessor will notify the Lessee immediately upon receipt of its internal approval (if any).

Payments:

Please see the attached Sample Payment Schedule and Cashflow Analysis, which utilizes the Indicative Interest Rate and a Commencement Date of September 30, 2016.

PLEASE BE ADVISED THAT THE PROPOSED INDICATIVE PRICING SET FORTH ABOVE IS ONLY AVAILABLE FOR TRANSACTIONS THAT ARE FULLY FUNDED OR FOR SPECIFIC EQUIPMENT THAT HAS COMMENCED FUNDING PURSUANT TO THIS PROPOSAL WITHIN 90 DAYS OF THE DATE OF THIS PROPOSAL LETTER.

THEREAFTER, THE LESSOR MAY AT ITS DISCRETION ADJUST ITS PRICING TO REFLECT ADVERSE CHANGES IN ITS COST OF FUNDS OR CHANGES GENERALLY IN MARKET CREDIT MARGINS.

**Optional
Prepayment:**

Beginning with the 1st payment and continuing through the final payment, Lessee will have the option to prepay its obligations under the Agreement in whole on any payment date with a prepayment premium of 2%.

Closing Costs:

Lessor does not charge any closing costs or fees. The Lessee will be responsible for its costs, including delivery of a validity opinion from Lessee Counsel.

Documents:

Documents shall be prepared by Lessor Counsel and will include all documents, certificates and opinions as are reasonably necessary to evidence and carry out the transaction. All documents must be acceptable to all parties.

**Payment &
Performance Bonds:**

The Lessor requires to be listed as dual obligee on the payment and performance bonds provided by Ameresco. No draws from Escrow will be permitted until such bonds are in place.

Credit Approval:

This proposal is an indication of interest in the transaction, and not a commitment to provide financing by the Lessor. Consummation of this transaction is subject to credit approval by the Lessor and execution and delivery of documentation acceptable to all parties, including the Purchase Contract. All fundings are subject to no material adverse change in the financial condition of the Lessee from the time of credit approval.

Assignment:

The Lessor shall be entitled to assign its right, title and interest or any part thereof in the Agreement and Equipment, on a private placement basis to qualified purchasers. In addition, the Lessor shall be entitled to assign its right, title and interest or any part thereof in the Agreement to a trustee for the purpose of issuing certificates of participation or other forms of certificates evidencing an undivided interest in such Agreement, provided such certificates are sold only on a private placement basis (and not pursuant to any "public offering") to a purchaser(s) who represent that (i) such purchaser has sufficient knowledge and experience in financial and business matters to be able to evaluate the risks and merits of the investment (ii) such purchaser understands neither the Agreement or certificates will be registered under the Securities Act of 1933, (iii) such purchaser is either an "accredited investor" within the meaning of Regulation D under the Securities Act of 1933, or a qualified institutional buyer within the meaning of Rule 144A, and (iv) that it is the intention of such purchaser to acquire such certificates (A) for investment for its own account or (B) for resale in a transaction exempt from registration under the Securities Act of 1933. At any time, the Lessor may sell, assign or encumber all or any part of its right title and interest in the Agreement; however, in no event shall the Lessor assign this Agreement as a public

offer of participation. The Lessee consents to a private placement transaction within the meaning of applicable federal securities laws.

**Lessee's
Responsibilities:**

All responsibilities imposed by the ownership or possession of the Equipment including, but not limited to, taxes, insurance and equipment maintenance, shall be borne by the Lessee.

**USA Patriot Act
Compliance:**

All financial institutions are required by Federal Law to obtain, verify and record information that identifies each customer who opens an account with us. When you open an account with us, we will ask you for your name, address and other information that will allow us to identify you, such as documents evidencing legal status and formation, taxpayer identification number and date of birth (if applicable).

**Market
Disruption:**

Notwithstanding anything contained herein to the contrary, in the event any material change shall occur in the financial markets after the date of this Proposal Letter, including but not limited to any governmental action or other event which materially adversely affects the extension of credit by banks, leasing companies or other lending institutions, the Lessor may modify the indicative pricing described above.

Capitalized terms used but not defined herein shall have the meaning given such terms in the transaction documents (i.e. the Agreement, the Purchase Contract and the Escrow).

This proposal letter and the Term Sheet include only a brief description of the principal terms of the Proposed Transaction and do not purport to summarize all of the conditions, covenants, representations, warranties and other provisions that would be contained in definitive documentation for the transaction contemplated hereby. The Lessor will not be responsible or liable for any damages, consequential or otherwise, that may be incurred or alleged by any person or entity, including the Lessee as a result of this Proposal Letter.

STANDARD DISCLOSURES AND DISCLAIMERS

The transaction described in this document is an arm's length, commercial transaction between you and Banc of America Public Capital Corp ("BAPCC") in which: (i) BAPCC is acting solely as a principal (i.e., as a lender or lessor) and for its own interest; (ii) BAPCC is not acting as a municipal advisor or financial advisor to you; (iii) BAPCC has no fiduciary duty pursuant to Section 15B of the Securities Exchange Act of 1934 to you with respect to this transaction and the discussions, undertakings and procedures leading thereto (irrespective of whether BAPCC or any of its affiliates has provided other services or is currently providing other services to you on other matters); (iv) the only obligations BAPCC has to you with respect to this transaction are set forth in the definitive transaction agreements between us; and (v) BAPCC is not recommending that you take an action with respect to the transaction described in this document, and before taking any action with respect to this transaction, you should discuss the information contained herein with your own legal, accounting, tax, financial and other advisors, as you deem appropriate. If you

would like a municipal advisor in this transaction that has legal fiduciary duties to you, you are free to engage a municipal advisor to serve in that capacity.

STATEMENT FOR PROPOSALS SUBMITTED UNDER RFPs

This proposal is submitted in response to your Request for Proposal (RFP 63-0022). The contents of this proposal and any subsequent discussions between us, including any and all information, recommendations, opinions, indicative pricing, quotations and analysis with respect to any municipal financial product or issuance of municipal securities, are provided to you in reliance upon the exemption provided for responses to requests for proposals or qualifications under the municipal advisor rules (the "Rules") of the Securities and Exchange Commission (240.CFR 15Ba1-1 et seq.).

The Staff of the SEC's Office of Municipal Securities has issued guidance which provides that, in order for a request for proposals to be consistent with this exemption, it must (a) identify a particular objective, (b) be open for not more than a reasonable period of time (up to six months being generally considered as reasonable), and (c) involve a competitive process (such as by being provided to at least three reasonably competitive market participants) or by being publicly posted to your official website. In submitting this proposal, we have relied upon your compliance with this guidance.

In submitting this proposal, we are not undertaking to act as a "municipal advisor" to you or any other person within the meaning of the Rules. In connection with this proposal and the transactions described herein, we are not subject to, and we hereby disclaim, any fiduciary duty to you or to any other person. We understand that you will consult with and rely on the advice of your own municipal, financial, tax, legal and other advisors as and to the extent you deem necessary in connection with your evaluation of this proposal and the transactions described herein.

Appendix R. Required Forms and Insurance Submittals

Per the requirements of Request for Proposal 63-0022, Section IX, the following required forms have been included herein.

- Offer and Acceptance
- Proposer's Contact Information

Ameresco has included as a statement from our broker, Arthur J. Gallagher & Co. certifying that Ameresco can comply with the insurance requirements in the event of contract award.

- Statement of ability to meet insurance requirements from Molly C. Lovelette, Area Vice President, Arthur J. Gallagher & Co., dated May 5, 2016.
- Certificates of Insurance



**IX – PROPOSER OFFER AND SUBMITTAL
(COMPLETE AND RETURN)**

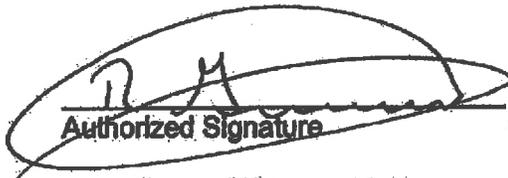
C. OFFER AND ACCEPTANCE:

D. TO THE CITY OF PHOENIX:

The Undersigned hereby offers and agrees to furnish the material and or service(s) in compliance with all terms, conditions, specifications, and addenda issued as a result of this Request for Proposals and any written exceptions in the offer.

Arizona Sales Tax No.	<u>07-584719-K</u>
Use Tax No. for Out-of State Suppliers	<u>04-3512838</u>
City of Phoenix Sales Tax No.	<u>01001786</u>

Proposer certifies that Proposer has read, understands, and will fully and faithfully comply with this Request for Proposals, any attachments and any referenced documents. Proposer also certifies that the prices offered were independently developed without consultation with any of the other proposers or potential proposers.


Authorized Signature

June 10, 2016
Date

Robert Georgeoff, Vice President
Printed Name and Title



**IX – PROPOSER OFFER AND SUBMITTAL
(COMPLETE AND RETURN)**

Proposer's Contact Information:

Company Name Ameresco, Inc.
Address 60 E. Rio Salado Parkway, Suite 1001
City, State and Zip Code Tempe, AZ 85281
Telephone Number 480.499.9200
Company's Fax Number 480.499.9171
Company's Toll Free # 866.263.7372
Email Address dhunter@ameresco.com
Website www.ameresco.com

Payment Address: (If different from above)

NOTE: Any assignment of proceeds must go through the City of Phoenix, Division of Accounts, and formal assignment procedure. Please also refer to the Assignment Provision, Section VIII(2) - Standard Terms and Conditions.

Name Accounts Receivable
Address 111 Speen Street, Suite 410
City, State and Zip Code Framingham, MA 01701

Payment Address: (If different from above)

Note: Any assignment of proceeds must go through the City of Phoenix, Division of Accounts, and formal assignment procedure. Please also refer to the Assignment Provision, Section VIII(2), Standard Terms and Conditions.

Name _____
Address _____
City, State and Zip Code _____



Arthur J. Gallagher & Co.

May 5, 2016

City of Phoenix, AZ
Attn: Charlene Reynolds
Street Transportation Deputy Director
Street Transportation Department
200 W. Washington, 5th Floor
Phoenix, AZ 85003

RE: City of Phoenix RFP #63-0022

Dear Charlene,

As the insurance broker for Ameresco, Inc., we certify that, if the bid is awarded, Ameresco can comply with the insurance requirements for the above-mentioned RFP with the exceptions noted below:

Section D.1.A – Ameresco's GL policy provides blanket additional insured wording via the attached endorsement. The requested additional insured wording will not be manuscripted to the policy.

Section D.2 – We cannot include the City of Phoenix as additional insureds on Workers Compensation/Employers Liability or Professional Liability. This is not industry-standard. The Professional Liability policy is written for the benefit of Ameresco, Inc. and is not primary and non-contributory.

Section D.6 – Ameresco can comply with this section, with the exception of Workers Compensation/Employers Liability.

Please feel free to contact me should you have any questions or concerns.

Sincerely,

Molly C. Lovelette

Molly C. Lovelette
Area Vice President
617-646-0245
Molly.Lovelette@ajg.com

Additional Insured – Automatic – Owners, Lessees Or Contractors



Policy No.	Eff. Date of Pol.	Exp. Date of Pol.	Eff. Date of End.	Producer No.	Add'l. Prem.	Return Prem.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

Named Insured: AMERESCO INC

Address (including ZIP Code):

111 SPEEN ST

FRAMINGHAM, MA 01701

This endorsement modifies insurance provided under the:

Commercial General Liability Coverage Part

A. Section II – Who Is An Insured is amended to include as an additional insured any person or organization whom you are required to add as an additional insured on this policy under a written contract or written agreement. Such person or organization is an additional insured only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf,

in the performance of your ongoing operations or "your work" as included in the "products-completed operations hazard", which is the subject of the written contract or written agreement.

However, the insurance afforded to such additional insured:

1. Only applies to the extent permitted by law; and
2. Will not be broader than that which you are required by the written contract or written agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusion applies:

This insurance does not apply to:

"Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering of, or failure to render, any professional architectural, engineering or surveying services including:

- III The preparing, approving or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
- III Supervisory, inspection, architectural or engineering activities.

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of or the failure to render any professional architectural, engineering or surveying services.

C. The following is added to Paragraph 2. Duties In The Event Of Occurrence, Offense, Claim Or Suit of Section IV – Commercial General Liability Conditions:

The additional insured must see to it that:

1. We are notified as soon as practicable of an "occurrence" or offense that may result in a claim;
2. We receive written notice of a claim or "suit" as soon as practicable; and
3. A request for defense and indemnity of the claim or "suit" will promptly be brought against any policy issued by another insurer under which the additional insured may be an insured in any capacity. This provision does not apply to insurance on which the additional insured is a Named Insured if the written contract or written agreement requires that this coverage be primary and non-contributory.

D. For the purposes of the coverage provided by this endorsement:

1. The following is added to the Other Insurance Condition of Section IV – Commercial General Liability Conditions:
Primary and Noncontributory Insurance

This insurance is primary to and will not seek contribution from any other insurance available to an additional insured provided that:

- a. The additional insured is a Named Insured under such other insurance; and
- b. You are required by written contract or written agreement that this insurance be primary and not seek contribution from any other insurance available to the additional insured.

2. The following paragraph is added to Paragraph 4.b. of the Other Insurance Condition of Section IV – Commercial General Liability Conditions:

This insurance is excess over:

Any of the other insurance, whether primary, excess, contingent or on any other basis, available to an additional insured, in which the additional insured on our policy is also covered as an additional insured on another policy providing coverage for the same "occurrence", offense, claim or "suit". This provision does not apply to any policy in which the additional insured is a Named Insured on such other policy and where our policy is required by a written contract or written agreement to provide coverage to the additional insured on a primary and non-contributory basis.

E. This endorsement does not apply to an additional insured which has been added to this policy by an endorsement showing the additional insured in a Schedule of additional insureds, and which endorsement applies specifically to that identified additional insured.

F. With respect to the insurance afforded to the additional insureds under this endorsement, the following is added to Section III – Limits Of Insurance:

The most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the written contract or written agreement referenced in Paragraph A. of this endorsement; or
2. Available under the applicable Limits of Insurance shown in the Declarations, whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

All other terms and conditions of this policy remain unchanged.

Client#: 2793

AMERESCO

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
12/02/2015

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Arthur J. Gallagher Risk Management Services, Inc. 470 Atlantic Avenue Boston, MA 02210	CONTACT NAME: PHONE (A/C No. Ext): 617 261-8700		FAX (A/C. No): 617-646-0400
	INSURE(S) AFFORDING COVERAGE		
INSURED Ameresco, Inc. 111 Speen Street Suite 410 Framingham, MA 01701	INSURER A: Zurich-American Insurance Compa		NAIC # 27855
	INSURER B: Nat'l Union Fire Insurance Co.		
	INSURER C: Steadfast Insurance Company		26387
	INSURER D: Navigators Insurance Company		42307
	INSURER E: INSURER F:		

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

TYPE	TYPE OF INSURANCE	ADDL. INSR. WVD	POLICY NUMBER	POLICY EFF. (MM/DD/YYYY)	POLICY EXP. (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY		GLO585238803	11/30/2015	11/30/2016	EACH OCCURRENCE \$2,000,000	
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PER-ACCIDENT <input type="checkbox"/> LOC						DAMAGE TO RENTED PREMISES (Per occurrence) \$500,000 MED EXP (Any one person) \$10,000 PERSONAL & ADV INJURY \$2,000,000 GENERAL AGGREGATE \$4,000,000 PRODUCTS - COMPROP AGG \$4,000,000
A	AUTOMOBILE LIABILITY		BAP585238703	11/30/2015	11/30/2016	COMBINED SINGLE LIMIT (Per accident) \$1,000,000	
	<input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS						BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
B	UMBRELLA LIAB		8786210	11/30/2015	11/30/2016	EACH OCCURRENCE \$25,000,000	
	<input checked="" type="checkbox"/> EXCESS LIAB DED RETENTION \$	<input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE					AGGREGATE \$25,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY		WC585394502	11/30/2015	11/30/2016	<input checked="" type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE/OFFICER/ MEMBER EXCLUDED? (Mandatory in MA) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N <input checked="" type="checkbox"/> N N/A					EL EACH ACCIDENT \$1,000,000 EL DISEASE - EA EMPLOYEE \$1,000,000 EL DISEASE - POLICY LIMIT \$1,000,000
C	Contractors Pollution		EOC689274305	11/30/2015	11/30/2016	\$10,000,000 agg/occ \$500,000 SIR	
D	Excess Liability		NY15EXC789982IV	11/30/2015	11/30/2016	\$25,000,000/\$25,000,000	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)
Evidence of Insurance
 Contractor Pollution Policy #EOC689274305 Effective 11/30/15-16:
 \$10,000,000 Aggregate/Occurrence
 \$500,000 SIR

CERTIFICATE HOLDER Ameresco, Inc. 111 Speen Street, Suite 410 Framingham, MA 01701-2090	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE 
---	--

**LINKING AGREEMENT
BETWEEN
THE CITY OF GLENDALE, ARIZONA
AND
AMERESCO, INC.**

**EXHIBIT B
Scope of Work**

PROJECT

The City of Phoenix selected Ameresco, Inc. to provide the Design and Installation of LED Street Lighting throughout the City of Phoenix. The scale of this project provides an opportunity for other Arizona Municipalities and State Entities to benefit from improved equipment cost based on Phoenix' estimated project size of over 95,000 fixtures. The City of Glendale has 20,200 streetlights and 93% of these lights would qualify for an LED conversion under the Phoenix contract with Ameresco. Replacement of High Pressure Sodium and Metal Halide light fixtures with energy-efficient LED fixtures is projected to reduce Glendale's electricity expense by \$494,000. Approximately \$225,000 in projected annual savings in line supplies and repair expenses are expected as well. These savings will allow the City to recover all of the cost of this LED conversion project over a projected 9.5 years.

**LINKING AGREEMENT
BETWEEN
THE CITY OF GLENDALE, ARIZONA
AND
AMERESCO, INC.**

EXHIBIT C

METHOD AND AMOUNT OF COMPENSATION

By JOC Linking Agreement, including all services, materials and costs.

NOT TO EXCEED AMOUNT

The total amount of compensation paid to Contractor for full completion of all work required by the Project must not exceed \$4,717,547 for the entire term of the Agreement.

DETAILED PROJECT COMPENSATION

See attached page.

Firm Name Ameresco - Capital Purchase-3000K Footcans

Energy Cost/MWh	0.07
Operating Hours	4300
Power Cost Escalation	1%
Years	15

Existing Inventory		Proposed Conversion				Estimated Energy Savings			Estimated Conversion Cost			Estimated Energy Cost		
Item No.	Quantity	Voltage	Lumens (Actual)	Wattage (Actual)	Model	Estimated Year-1 Energy Cost	Estimated 15-Year Energy Cost	Weightage (Actual)	Estimated Energy Savings (\$/Year)	Estimated Energy Savings (\$/Year)	Not-to-Exceed Material \$/Fixture w/o Taxes	Not-to-Exceed Installation \$/Fixture w/o Taxes	Estimated Year-1 Energy Cost	Estimated 15-Year Energy Cost
1-A	-	120	5,600	85	Illuminate A - ATBS D MVOLT R2 - 30K	-	-	33	-	-	41.24	41.24	-	-
2-B	10,417	120	16,000	120	Illuminate B - ATBS D MVOLT R2 - 30K	\$ 376,232	\$ 6,056,851	4,118	\$ 3,897,700	\$ 277,750	\$ 41.24	\$ 1,700,800	\$ 105,472	\$ 1,695,679
3-C	2,053	120	16,000	176	Illuminate C - ATBS I MVOLT R2 - 30K	\$ 109,760	\$ 1,750,684	4,157	\$ 67,790	\$ 121,541	\$ 41.24	\$ 436,628	\$ 46,984	\$ 795,981
4-D	4,921	120	30,000	293	Illuminate D - ATBS I MVOLT R2 - 30K	\$ 493,688	\$ 6,968,016	3,213	\$ 2,729,670	\$ 181,078	\$ 41.24	\$ 1,650,656	\$ 242,920	\$ 3,910,282
5-E	194	120	50,000	451	Illuminate E - ATBS 800LEDED MVOLT TTS - 30K	\$ 26,358	\$ 428,923	18.1	\$ 146,685	\$ 10,218	\$ 41.24	\$ 128,538	\$ 9,517	\$ 259,450
6-F	183	120	50,000	276	Illuminate B - ATBS D MVOLT R2 - 30K	\$ 4,397	\$ 456,996	4,157	\$ 284,043	\$ 20,583	\$ 41.24	\$ 128,538	\$ 1,869	\$ 30,543
7-C	240	240	18,000	176	Illuminate D - ATBS I MVOLT R2 - 30K	\$ 20,373	\$ 70,776	8,213	\$ 35,690	\$ 2,489	\$ 41.24	\$ 171,241	\$ 11,403	\$ 183,654
8-D	231	240	30,000	451	Illuminate E - ATBS 800LEDED MVOLT TTS - 30K	\$ 1,222	\$ 327,856	17,182	\$ 128,136	\$ 8,970	\$ 41.24	\$ 79,071	\$ 11,403	\$ 183,654
9-E	8	240	50,000	451	Illuminate D - ATBS I MVOLT R2 - 30K	-	\$ 19,667	8,213	-	\$ 474	\$ 478,689	\$ 41.24	\$ 748	\$ 12,035
10A-C	-	120	18,000	176	Illuminate C - ATBS I MVOLT R2 - 30K	-	-	8,213	-	-	\$ 171,241	\$ 41.24	-	-
10B-C	-	240	18,000	176	Illuminate C - ATBS I MVOLT R2 - 30K	-	-	76	-	-	\$ 171,241	\$ 41.24	-	-
	18,694					\$ 899,737	\$ 16,092,660		\$ 5,120,096	\$ 558,407		\$ 4,152,400	\$ 431,330	\$ 6,943,079

Estimate Percent of LED Installations Completed	5%
2 months after contract award:	30%
6 months after contract award:	55%
12 months after contract award:	80%
18 months after contract award:	100%
24 months after contract award:	

Plus ADDITIONAL Development/Phase Fee Excluding Taxes (If Applicable) (Not-to-Exceed) \$ 189,122
 Plus ADDITIONAL Implementation/Phase Fee Excluding Taxes (If Applicable) (Not-to-Exceed) \$ 121,856
 Plus Year-Year Labor / Five-Year Material Warranty Cost Excluding Taxes (Not-to-Exceed) \$ 265,121
 Plus Taxes (6.99%)
 Total Project Installation and Warranty Cost (Not-to-Exceed) \$ 4,717,247
 Less APS Rebate (Estimated) (If Applicable) [Enter as Negative] * TBD
 Less Recycling Revenue for the City (Estimated) (If Applicable) [Enter as Negative] * TBD
 Plus 15-Year Project Energy Cost (Estimated) \$ 6,943,079
 Less 15-Year Ending Inventory Energy Cost (Estimated) \$ (16,092,660)
 Estimate: Net 15-Year Base Project Cost (Excluding Maintenance Savings) \$ (4,432,035)
 Observed Ten-Year Labor / Ten-Year Material Warranty Cost Including Taxes (Not-to-Exceed) \$ 361,687