As required within Request for Proposals 63-0022, please utilize this document to notate exactly where in your submittal this information can be found.

LED LUMINAIRE TECHNICAL SPECIFICATIONS

General Requirements:

The proposer shall identify the manufacturer and series of LED luminaires that are proposed for use on this project. Only one manufacturer and a maximum of two series of luminaires are allowed for use on this project. The proposer shall identify the exact model and catalog number of each luminaire to meet the requirements of the following specifications. If the manufacturer introduces a newer technology in the same series of LED luminaires prior to ordering the fixtures, the successful bidder may submit the new fixture to the City for approval at no additional cost to the City. If a fixture is lower in cost, the successful proposer shall provide the city with credit for the price differential.

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 Light Emitting Diode (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 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.

- 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 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.

- 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.
  - 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, 3,000K ± 300K and 3,500K ± 300K and 4,000K ± 300K.

- The 4,000K luminaire shall have a minimum luminaire efficacy of 100 lumens/watt.

- The 3,000K luminaire shall have a minimum luminaire efficacy of 85 lumens/watt.

- The luminaire shall have a minimum Color Rendering Index (CRI) of 70.

- The Lumen Maintenance Life (L70) from the TM-21 Report must not be below 82% or L82 at 70,000 hours at 25°C ambient for the 3,000K and 4,000K luminaires.

- 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.

Minimum Warranty Requirements

- Two (2) Year Labor Warranty – any failures replaced at no cost to the City; Five (5) Year Hardware Warranty for fixtures. Proposers must provide the incremental cost, if any, to provide the City with a 10 year fixture warranty.
D. **LUMINAIRE PERFORMANCE REQUIREMENTS**

The proposed LED luminaires will replace the following existing high pressure sodium (HPS) luminaires in the typical street/sidewalk 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 shall be performed using luminaires for 2,700K, 3,000K, 3,500K and 4,000K correlated color temperatures for each of the layouts provided below. The photometric calculations/measurement points shall be in conformance with IES RP-8-14 and shall use AGi32 software. Lighting design criteria are based on pavement luminance values with a roadway surface classification of R3. Photometry for 2,700K and 3,500K luminaires may use photometric (.ies) files for 3,000K or 4,000K luminaires that are scaled to 2,700L and 3,500K. Original photometric files and scaling factors shall be included in documentation. The following values shall be provided for each layout. All results shall be provided to the nearest hundredth.

- Minimum maintained average pavement luminance (cd/m²)
- Average uniformity ratio ($L_{avg}/L_{min}$)
- Maximum uniformity ratio ($L_{max}/L_{min}$)
- Maximum veiling luminance ratio ($L_{Vmax}/L_{avg}$)

**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 shall be for maintained values using a Light Loss Factor (LLF) as defined below.
LLF = LLD \times LDD

Lamp Lumen Depreciation factor (LLD) shall be 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 luminaires and their performance information shall be submitted in the following format: