

**LED REQUIREMENTS**

A. CORRELATED COLOR TEMPERATURE (CCT) 3000K. ACCEPTABLE LM80 TEST RESULTS SHALL BE PROVIDED.

B. COLOR RENDERING INDEX (CRI) MINIMUM 70

C. OPERATING ENVIRONMENT, AMBIENT -40°C TO +40°C ( -40°F TO 104°F)

D. VOLTAGE 480V OR 120V (THE CITY OF COLUMBUS USES A 480V OR 120V DISTRIBUTION SYSTEM)

E. COOLING SYSTEM - PASSIVE HEAT SINK WITH NO FANS, PUMPS, OR LIQUIDS, AND SHALL BE RESISTANT TO DEBRIS BUILD-UP THAT DOES NOT DEGRADE HEAT DISSIPATION PERFORMANCE.

**APPLICATION**

DESIGNER NOTE:

THE TEARDROP LUMINAIRE MAY BE USED FOR:

- 1) NEW INSTALLATION OF TEARDROP LUMINAIRES ON NEWLY PLACED SUPPORTS WHOSE SPACING HAS BEEN DESIGNED SPECIFICALLY FOR THE LUMINAIRE. STREET LIGHT DESIGNS USING PHOTOMETRIC SOFTWARE ARE REQUIRED FOR EACH LUMINAIRE. THE DESIGNER SHALL COMPLY WITH IESNA RP-08 (latest version).
- 2) REPLACING EXISTING HID LUMINAIRES ON EXISTING POLES WHERE SPACING REMAINS UNCHANGED.

**HOUSING**

THE HOUSING SHALL BE CONSTRUCTED OF DIE-CAST ALUMINUM OR SAND-CAST AND SHALL BE RUST RESISTANT. PAINT FINISH SHALL BE POWDER-COATED BLACK, GREEN OR AS DIRECTED BY THE CITY OF COLUMBUS DIVISION OF POWER. THE PAINT FINISH SHALL EXCEED A RATING OF SIX PER ASTM D 1654 AFTER 1000 HOURS OF TESTING PER B117. PAINTED OR FINISHED LUMINAIRE COMPONENTS EXPOSED TO THE ENVIRONMENT SHALL EXHIBIT NO GREATER THAN 30% REDUCTION OF GLOSS PER ASTM D523, AFTER 500 HOURS OF QUV TESTING AT ASTM G154 CYCLE 6. LUMINAIRE HOUSING SHALL ALLOW TOOL-LESS ENTRY. ALL SCREWS AND MOUNTING HARDWARE SHALL BE STAINLESS STEEL. NO PARTS SHALL BE CONSTRUCTED OF POLYCARBONATES. LUMINAIRE OPTICAL ASSEMBLY SHALL BE HINGED FROM THE ELECTRICAL ASSEMBLY AND SECURED IN PLACE WITH A STAINLESS STEEL WING NUT STYLE LATCH ASSEMBLY. THE OPTICAL ASSEMBLY SHALL BE IP66 RATED. LUMINAIRE SHALL BE ATTACHED BY MEANS OF A SELF-LEVELING

FITTER TO A 2" OD BRACKET ARM. THE SELF-LEVELING FITTER SHALL INCLUDE MEANS FOR SECURELY ATTACHING ITSELF TO THE BRACKET ARM WITH STAINLESS STEEL HARDWARE AND ALLOW ADJUSTMENTS OF +/-5 DEGREES HORIZONTAL AND +/-4 DEGREES VERTICAL. THE LUMINAIRE SHALL HAVE LESS THAN THE CONCENTRATION VALUES OF THE FOLLOWING RoHS RESTRICTED SUBSTANCES: MERCURY, CADMIUM, CHROMIUM VI, POLYBROMINATED BIPHENYL, POLYBROMINATED DIPHENYL ETHER, BIS (2-ETHYLHEXYL) PHTHALATE (BBP), BENZYL BUTYL PHTHALATE, (DBP), DIISOBUTYL PHTHALATE (DIBP) AND LEAD.

**LED POWER SUPPLY / DRIVER**

A) POWER FACTOR, MINIMUM 0.90

B) DRIVER OUTPUT CURRENT, mA VARIABLE

C) DIMMING SIGNAL, CONTROL RANGE, VDC 0 TO 10

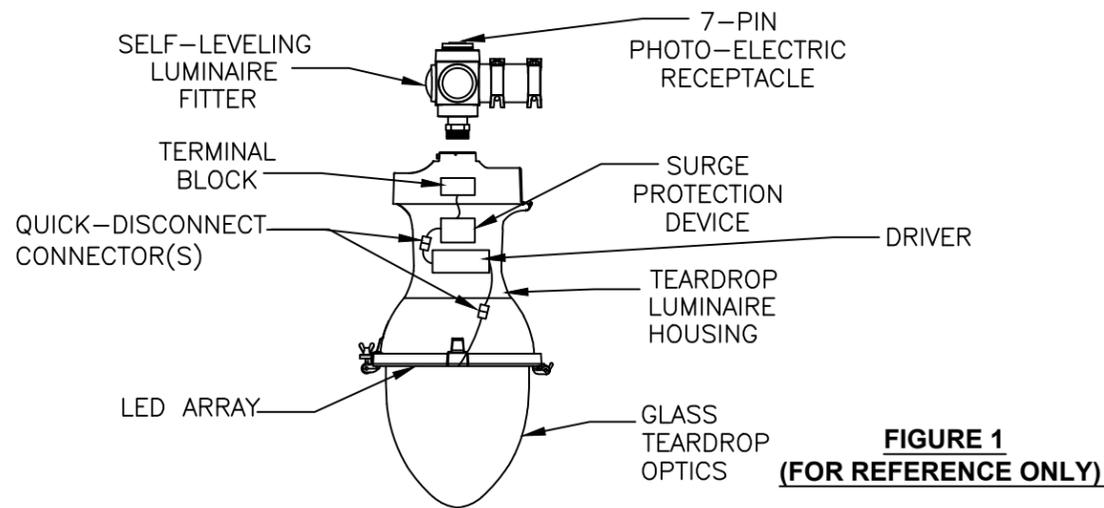
D) SURGE PROTECTION DEVICE SHALL COMPLY WITH ANSI C136.37, ANSI/IEEE C62.41.2. EACH SURGE PROTECTION DEVICE SHALL BE INTERNALLY MOUNTED INSIDE HOUSING AND SPECIFIED FOR 480V OR 120V OPERATION WITH A MINIMUM 10KV/10KA SURGE PROTECTION. THE SURGE PROTECTION DEVICE SHALL BE A UL 1449 3RD EDITION TYPE 4 RECOGNIZED COMPONENT FOR USE IN TYPE 2 LOCATIONS.

E) LED DRIVER SHALL BE MOUNTED INSIDE THE HOUSING, REPLACEABLE, AND SHALL BE PRE-WIRED TO 480V OR 120V READY FOR INSTALLATION. DRIVER AND LED ARRAYS SHALL BE DESIGNED FOR MULTI-CURRENT INPUT OPERATIONS WITH 0-10V DRIVER ADJUSTABLE OUTPUT. THE LED DRIVER SHALL COMPLY WITH FCC RULES AND REGULATIONS, TITLE 47 CFR PART 15 NON-CONSUMER (CLASS A). LED DRIVER SHALL TOLERATE SUSTAINED OPEN CIRCUIT AND SHORT CIRCUIT OUTPUT CONDITIONS WITHOUT DAMAGE. LED DRIVER SHALL HAVE AN INDEPENDENTLY VERIFIED AND DOCUMENTED FAILURE RATE OF  $\leq 0.01\%$  PER 1000 HOURS. WIRING INSIDE THE HOUSING SHALL COMPLY WITH 600V/105°C RATING OR HIGHER. THE LED DRIVER SHALL HAVE A "CLASS A" SOUND RATING. POWER SUPPLY/DRIVER SHALL BE UL RECOGNIZED FOR DRY AND DAMP LOCATIONS. ALL OTHER ELECTRICAL COMPONENTS SHALL BE UL LISTED OR RECOGNIZED FOR WET LOCATIONS. OUTPUT OPERATING FREQUENCY MUST BE  $\geq 120\text{HZ}$  AND INPUT OPERATING FREQUENCY OF 60 HZ. THE LED DRIVER SHALL BE RoHS COMPLIANT.

<b>MIS-198</b>	DEPARTMENT OF PUBLIC UTILITIES - DIVISION OF POWER CITY OF COLUMBUS, OHIO	
	<b>STREET LIGHT LUMINAIRE LED TEARDROP STYLE</b>	
	DRAWN BY: CMS	DATE: 12/13/16
	APPROVED:	
SCALE: NONE	SHEET: 1 OF 4	

**LED MODULE / ARRAY REQUIREMENTS**

LED MODULE(S)/ARRAY(S) SHALL DELIVER A MINIMUM OF 70% OF INITIAL LUMENS WHEN INSTALLED FOR 100,000 HOURS AND MEET L70 STANDARDS. LIGHTING DISTRIBUTION SHALL BE IN ACCORDANCE WITH "IESNA LIGHTING DISTRIBUTIONS". LAMP LUMEN DEPRECIATION FACTOR SHALL BE SUPPORTED BY TM-21 DATA @ 25 °C FOR 50,000 HOURS. LUMINAIRE DIRT DEPRECIATION(LDD) SHALL BE 0.90 FOR GLASS OPTICS. IT IS THE RESPONSIBILITY OF EACH MANUFACTURER TO PROVIDE A CALCULATION OF LAMP LUMEN DEPRECIATION(LLD). LIGHT LOSS FACTOR USED IN PHOTOMETRIC LAYOUT CALCULATIONS SHALL BE THE PRODUCT OF LDD AND THE MANUFACTURER'S PROJECTED LAMP LUMEN DEPRECIATION AT 100,000 HOURS AT 25°C AMBIENT TEMPERATURE. LUMEN MAINTENANCE SHALL BE A MINIMUM OF 70% OVER 100,000 HOURS OF LIFE WHEN OPERATING AT TEMPERATURES OF 40°C (104°F) OR LESS. THE LUMINAIRE SHALL CONTINUE TO OPERATE AND MAINTAIN THE MINIMUM OPTICAL PERFORMANCE CRITERIA FOR THE PARTICULAR APPLICATION IN WHICH IT IS INSTALLED. OPTICAL SYSTEM COMPONENTS SHALL BE RATED AT IP66 TO PROTECT AGAINST WATER, DIRT, AND INSECT INFILTRATION, AND BE RoHS COMPLIANT. LUMINAIRE CIRCUITRY SHALL INCLUDE QUICK CONNECT/DISCONNECT FOR EASY SEPARATION. SEE FIGURE 1.



THE MINIMUM OPTICAL PERFORMANCE IS DEFINED BY THE APPLICATION INSTALLATION IN CONJUNCTION WITH THE "CITY OF COLUMBUS, DIVISION OF POWER GUIDELINES FOR STREET LIGHTING CIRCUIT LAYOUT".

**7-PIN PHOTO-ELECTRIC RECEPTACLE**

THE LUMINAIRE SHALL BE FURNISHED WITH A 7-PIN PHOTO-ELECTRIC RECEPTACLE INSTALLED IN THE TOP OF THE LUMINAIRE HOUSING. THE RECEPTACLE SHALL BE TWIST LOCK TYPE, AND HAVE THE CAPABILITY TO BE DIRECTIONALLY ADJUSTED. THE 7-PIN PHOTO -ELECTRIC RECEPTACLE SHALL BE SUITABLE FOR OPERATION WITH LED LUMINAIRES, AND CONFORM TO ANSI DESIGN STANDARD C136.10. THE PHOTO-ELECTRIC SOCKET SHALL ACCOMMODATE DIMMING AND/OR AUTOMATION INTEGRATION.

**7-PIN LONG LIFE PHOTO CONTROL (AS REQUIRED BY THE ENGINEER)**

THE LUMINAIRE SHALL BE SUPPLIED WITH A "LONG LIFE" PHOTO CONTROL THAT SHALL BE SOLID STATE, AND SUITABLE FOR OPERATION WITH 7-PIN PHOTO CONTROL RECEPTACLES AND LED LUMINAIRES. THE PHOTO CONTROL SHALL HAVE A MINIMUM DESIGN LIFE OF 20 YEARS.

**SHORTING CAP FOR 7-PIN LED PHOTO-ELECTRIC RECEPTACLE (480 VOLT LUMINAIRE ONLY)**

THE LUMINAIRE SHALL BE SUPPLIED WITH A SHORTING CAP SUITABLE FOR OPERATION WITH A 7-PIN LED PHOTO ELECTRIC RECEPTACLE. THE SHORTING CAP SHALL CONTAIN A GASKET AROUND THE OUTER PERIMETER OF THE CAP FOR PROPER SEALING AGAINST DEBRIS. THE SHORTING CAP SHALL MEET OR EXCEED ANSI DESIGN STANDARD ANSI C136.10.

**TESTING / CERTIFICATION / STANDARDS / RECOMMENDED PRACTICES**

LUMINAIRE SHALL COMPLY WITH:

- A) ANSI C136:31 2010 (or latest) FOR 100,000 CYCLES AT 1.5G ACCELERATION FOR NORMAL ROAD APPLICATIONS.
- B) UL/CUL LISTED, SUITABLE FOR WET LOCATIONS PER UL 1598 OR CSA C22.2 NUMBER 250.
- C) THE LED OPTICAL ASSEMBLY AND DRIVER SHALL BE IP66 RATED PER IEC60529.
- D) LUMINAIRE COMPONENTS AND APPLIED FINISHES SHALL COMPLY WITH THE 1000 HOUR SALT/FOG TEST PER ASTM B117 STANDARD.
- E) LM-79 OPTICAL PERFORMANCE TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH IESNA STANDARD PRACTICES FOR SOLID STATE LIGHTING
- F) LUMINAIRE SHALL BE CERTIFIED WITH A BUG RATING (BACKLIGHT, UPLIGHT, GLARE)
- G) IESNA LM-80-15 (or latest)
- H) ANSI C136.41-2013 (or latest)
- I) ANSI C136.37 2011 (or latest)
- J) ANSI C136.22 -2004 (or latest)
- K) IEC 60529 (or latest)
- L) IEEE C62.41.2-2002 (or latest)
- M) IESNA TM-15-11 (or latest)
- N) RoHS
- O) ANSI C136.10-2010 (or latest)
- P) ANSI C78.377-2008 (or latest) (Chromaticity of solid state lighting products)
- Q) TM-21-11 (or latest)
- R) ASTM D1654-08 (or latest)
- S) IES LM-79-08 (or latest)
- T) UL 1449 (Surge Protection Devices)

<b>MIS-198</b>	DEPARTMENT OF PUBLIC UTILITIES - DIVISION OF POWER CITY OF COLUMBUS, OHIO		
	<b>STREET LIGHT LUMINAIRE LED TEARDROP STYLE</b>		
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	APPROVED:		
SCALE: NONE	SHEET: 2 OF 4		

**WARRANTY**

THE WARRANTY SHALL PROVIDE FOR THE FULL REPLACEMENT OF THE ENTIRE LUMINAIRE ASSEMBLY, WHICH INCLUDES THE POWER SUPPLIES/DRIVER, DEFECTIVE ELECTRICAL AND NON- ELECTRICAL PARTS, AND LIGHT SOURCE FOR A PERIOD OF TEN (10) YEARS FROM DATE OF ACCEPTANCE. THE LUMINAIRE SHALL BE COVERED FOR PART REPLACEMENT OF DEFECTIVE LUMINAIRES DURING THE WARRANTY PERIOD. NEGLIGIBLE LIGHT OUTPUT FROM MORE THAN 10 PERCENT OF THE LED PACKAGES CONSTITUTES LUMINAIRE FAILURE. LONG-LIFE PHOTOCONTROL SHALL BE COVERED FOR FULL REPLACEMENT FOR A PERIOD OF TEN(10) YEARS FROM THE DATE OF ACCEPTANCE FOR ANY FAILURE AND/OR DEFECT IN WORKMANSHIP.

**WEIGHT**

LUMINAIRE SHALL NOT WEIGH MORE THAN 75 POUNDS.

**EFFECTIVE PROJECTED AREA (EPA)**

LUMINAIRE SHALL NOT HAVE AN EPA MORE THAN 2.70 SQ. FT.

**DELIVERY, STORAGE AND HANDLING**

A) DELIVERY

1. LED LUMINAIRES SHALL BE DELIVERED TO THE JOB SITE AS TO NOT CAUSE DAMAGE OR REQUIRED REPAIRS. LUMINAIRE SHALL BE 100% FACTORY TESTED PRIOR TO SHIPMENT.

2. DELIVERY OF MATERIAL SHALL BE COORDINATED WITH OTHER TRADES TO AVOID DELAYS.

B) STORAGE OF MATERIALS

1. MATERIAL SHALL BE STORED IN STRICT COMPLIANCE WITH MANUFACTURE'S RECOMMENDATIONS.

C) HANDLING

1. HANDLE ALL PRODUCTS WITH CARE. ONLY SOUND, UNDAMAGED PRODUCTS SHALL BE ACCEPTED.

**INSTALLATION**

THE LUMINAIRE SHALL BE INSTALLED ON SELF-LEVELING FITTER AND BRACKET AS SHOWN ON THE CONTRACT DRAWINGS AND MIS SPECIFICATIONS. ORIENTATION AND LEVELING OF THE UNITS SHALL BE SO AS TO PROVIDE FOR UNIFORM APPEARANCE, MAXIMUM LIGHTING EFFICIENCY AND EASE OF MAINTENANCE.

**INTERNAL LABELING**

A VISIBLE LABEL SHALL BE PERMANENTLY ATTACHED TO THE INSIDE SURFACE OF EACH LUMINAIRE HOUSING. THE INTERNAL LABEL SHALL MEET THE REQUIREMENTS OF ANSI C 136.22 - 2011(OR LATEST). THE LABEL SHALL INCLUDE THE FOLLOWING.

- MANUFACTURER'S NAME AND CATALOG NUMBER
- MONTH AND YEAR OF MANUFACTURE
- LINE INPUT VOLTAGE
- FREQUENCY IF OVER 60 HERTZ
- DRIVER TYPE (MAY BE ON DRIVER)
- LUMINAIRE TYPE, WATTAGE AND VOLTAGE(MAY BE ON DRIVER)

- DESCRIPTIVE WIRING DIAGRAM SHOWING INPUT TERMINALS, DRIVER, CAPACITORS, STARTING AID, PHOTO-CONTROL RECEPTACLE AND LED ARRAY

**SUBMITTALS**

A) THE FOLLOWING SUBMITTALS SHALL BE MADE WITH THE BID:

- 1) LUMINAIRE SUBMITTAL FORM
- 2) UTILIZATION CURVES
- 3) ISOLUX LINES OF HORIZONTAL FOOT-CANDLES
- 4) ISOCANDLE CURVES FROM PHOTOMETRIC TEST
- 5) LUMINAIRE SPECIFICATION SHEET
- 6) LED LIGHT SOURCE SPECIFICATION SHEET
- 7) LED DRIVER SPECIFICATION SHEET
- 8) SURGE PROTECTION DEVICE SPECIFICATION SHEET
- 9) LM-79 TEST REPORT
- 10) LM-80 TEST REPORT
- 11) TM-21 TEST REPORT

B) AT THE TIME OF THE SUBSTANTIAL COMPLETION/ACCEPTANCE OF THE PROJECT, THE CONTRACTOR SHALL SUBMIT THE MANUFACTURER'S TEN (10) YEAR WARRANTY DOCUMENTATION.

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**CITY OF COLUMBUS: DIVISION OF POWER  
LED LUMINAIRE SUBMITTAL FORM  
MATERIAL SPECIFICATION**

Luminaire Catalog Number: \_\_\_\_\_ Manufacturer: \_\_\_\_\_

Project: \_\_\_\_\_ Drawing Number: \_\_\_\_\_

GENERAL CRITERIA: LED LUMINAIRE		
<b>LUMINAIRE</b>	Wattage of Luminaire	
	Voltage of Luminaire	
	Weight of Luminaire (Not To Exceed 75 lbs.)	
	Luminaire Effective Projected Area (EPA)	
	Luminaire Housing Finish Color (Gray, Black, Bronze)	
<b>MOUNTING METHOD</b>	<input type="checkbox"/> Post-Top <input type="checkbox"/> Side-Arm <input type="checkbox"/> Swivel-Tenon	
	Tenon Nominal Pipe Size (NPS)	
<b>LENS:</b>	<input type="checkbox"/> Flat <input type="checkbox"/> Sag / Drop <input type="checkbox"/> Teardrop <input type="checkbox"/> Prismatic Acorn/Traditional	
<b>IES FORWARD DISTRIBUTION TYPE</b>	<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VS	
<b>IES LATERAL DISTRIBUTION TYPE</b>	<input type="checkbox"/> Very Short <input type="checkbox"/> Short <input type="checkbox"/> Medium <input type="checkbox"/> Long <input type="checkbox"/> Very Long	
<b>DRIVER</b>	Variable Output: (Specify Current Output Setting in mA)	
	Minimum Available Output	
	Maximum Available Output	
	Dimmable	0-10 Volts
<b>ELECTRICAL IMMUNITY</b>	Minimum Requirements For Surge Suppression	10 KV / 10 KA
<b>PHOTOCONTROL</b>	Photocontrol Receptacle Style	7-PIN <input type="checkbox"/> YES
		TWIST-LOCK <input type="checkbox"/> YES
	Long Life Photocontrol	7-PIN Compatible <input type="checkbox"/> YES
	Shorting Cap Included (480 Volt Luminaires Only)	<input type="checkbox"/> YES <input type="checkbox"/> NO
<b>WARRANTY</b>	Minimum Warranty Requirement	10 Years
PERFORMANCE CRITERIA: LED LUMINAIRE		
<b>NOMINAL CCT</b>	Rated Correlated Color Temperature (3000K)	
<b>LIGHT LOSS FACTOR</b>	(LDD + Projected Lumen Depreciation @ 100,000 HRS in 25°C Ambient Temperature)	
<b>PHOTOPIC<sup>2</sup> DOWNWARD LUMINAIRE OUTPUT</b>	Initial Luminaire Output Below Horizontal	
	Minimum maintained Luminaire Output Below Horizontal	
<b>BUG RATING:</b>	Max. Nominal Backlight-Up light-Glare ratings	
<b>ANSI VIBRATION TEST LEVEL</b>	Level 1 (Normal) Level 2 (Bridge/Overpass)	
<b>THERMAL ENVIRONMENT</b>	Minimum Ambient Operating Temperature	
	Maximum Ambient Operating Temperature	

**SPARE PARTS**

THE CONTRACTOR SHALL PROVIDE 3% OF THE CONSTRUCTION QUANTITIES OF THE COMPLETE LUMINAIRE, ROUNDED UP TO THE NEAREST WHOLE NUMBER AND SHALL BE A MINIMUM OF 2 LUMINAIRES - EACH.

ALL SPARE PARTS SHALL BE WARRANTED BY THE PRODUCT MANUFACTURER FOR FORM, FIT, AND FUNCTION AND SHALL BE FULLY COMPATIBLE WITH THE PRODUCT SUPPLIED. IN ADDITION, ALL SPARE PARTS SHALL BE WARRANTED AGAINST FAILURE FOR A PERIOD NOT LESS THAN 10 YEARS..

SPARE PARTS SHALL BE PACKAGED TO PREVENT CORROSION OR DETERIORATION DURING LONG-TERM STORAGE AND DELIVERED UNDAMAGED TO THE DIVISION OF POWER, 3500 INDIANOLA AVENUE, COLUMBUS, OHIO 43214. THE RECEIPT OF DELIVERY SHALL BE CONSIDERED PART OF THE SUBSTANTIAL COMPLETION REQUIREMENT.

ALL PACKAGING SHALL BE CLEARLY LABELED WITH THE PRODUCT MANUFACTURER'S NAME AND PART NUMBER. ELECTRONIC PARTS SHALL BE PACKED IN SEALED PLASTIC WRAPPERS OR HERMETICALLY-SEALED CONTAINERS. DESICCANT-CARTRIDGES SHALL BE INCLUDED IN THE PACKAGING.

**RECOMMENDED MANUFACTURERS**

THE FOLLOWING MANUFACTURERS ARE RECOMMENDED TO PROVIDE LED TEARDROP STYLE LUMINAIRES OR APPROVED EQUAL.

1. HOLOPHANE LIGHTING (ESPLANADE SERIES)
2. PHILIPS/LUMEC LIGHTING (RENAISSANCE SERIES)
3. STERNBERG LIGHTING (LIBERTYVILLE SERIES)

**BASIS OF PAYMENT**

THE STREET LIGHT LUMINAIRE, LED TEARDROP STYLE SHALL BE PAID AS A UNIT PRICE EACH AS SPECIFIED IN THE CONTRACT DOCUMENTS.

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