

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 480 VOLT

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 LED UNDERPASS STYLE LUMINAIRE MAY BE USED FOR:

- 1) NEW INSTALLATION OF UNDERPASS STYLE LUMINAIRES ON NEWLY CONSTRUCTED 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 UNDERPASS LUMINAIRES ON EXISTING SUPPORTS WHERE SPACING REMAINS UNCHANGED.

HOUSING

THE HOUSING SHALL BE CONSTRUCTED OF DIE-CAST ALUMINUM AND SHALL BE RUST RESISTANT. PAINT FINISH SHALL BE POWDER-COATED BLACK, 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. ALL EXTERNAL SCREWS SHALL BE STAINLESS STEEL. NO PARTS SHALL BE CONSTRUCTED OF POLYCARBONATES. TWO HOUSING MOUNTING METHODS SHALL BE ALLOWED: 1) FLUSH-MOUNT THE HOUSING DIRECTLY ONTO THE VERTICAL SURFACE. 2) USE FIXED WALL-MOUNT BRACKETS. A MINIMUM OF FOUR HEX HEAD STAINLESS STEEL BOLTS SHALL BE USED TO MOUNT THE HOUSING TO THE WALL OR SUPPORT STRUCTURE. THE LUMINAIRE SHALL NOT EXTEND MORE THAN 12" FROM THE WALL/SUPPORT. THE HOUSING SHALL BE EQUIPPED WITH A 3/4-NPT TOP ENTRY SO THE LUMINAIRE CAN BE INDIVIDUALLY MOUNTED OR THE HOUSING SHALL BE EQUIPPED WITH TWO 3/4-NPT SIDE ENTRIES SO THE LUMINAIRE CAN BE MOUNTED IN A CONTINUOUS ROW AND ACCOMMODATE THROUGH-WIRING. THE HOUSING SHALL HAVE A MAXIMUM SIZE OF

24" WIDE BY 18" OF HEIGHT. A HINGED DOOR SHALL ALLOW ACCESS TO THE ELECTRICAL COMPONENTS AND BE SECURELY CLOSED WITH STAINLESS STEEL BOLTS. 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

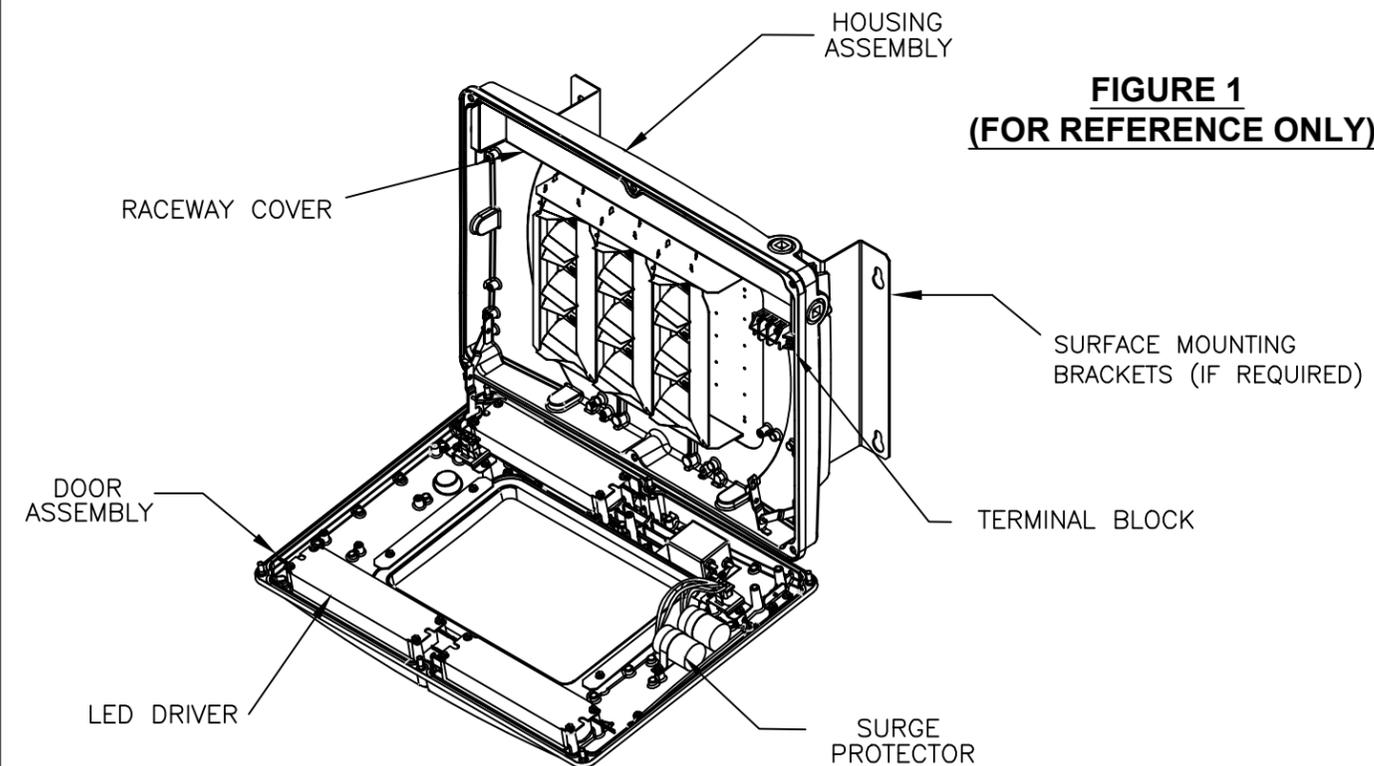
D) SURGE PROTECTION DEVICE SHALL COMPLY WITH ANSI C136.37, ANSI/IEEE C62.41.2. EACH SURGE PROTECTION DEVICE SHALL BE INTERNALLY MOUNTED INSIDE HOUSING AND SPECIFIED FOR 480V OPERATION WITH A MINIMUM 10KV/5KA SURGE PROTECTION. THE SURGE PROTECTION DEVICE SHALL BE UL 1449 3RD EDITION TYPE 4 RECOGNIZED COMPONENT FOR USE IN TYPE 2 LOCATIONS.

E) LED DRIVER SHALL BE MOUNTED INSIDE THE HOUSING, REPLACEABLE, AND SHALL BE PRE-WIRED TO 480V 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.

MIS-202	DEPARTMENT OF PUBLIC UTILITIES - DIVISION OF POWER CITY OF COLUMBUS, OHIO		
	STREET LIGHT LUMINAIRE LED UNDERPASS STYLE		
	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".

TESTING / CERTIFICATION / STANDARDS / RECOMMENDED PRACTICES

LUMINAIRE SHALL COMPLY WITH:

- A) ANSI C136:31 2010 (or latest) FOR 100,000 CYCLES AT 3.0G ACCELERATION FOR NORMAL ROAD AND BRIDGE 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 Device)
- U) IEC 6100 - ELECTROMAGNETIC COMPATIBILITY TEST (EMC)
- V) ANSI C82.77-02 (or latest) HARMONIC DISTORTION

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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 60 POUNDS.

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 AN UNDERPASS WALL OR SUPPORT STRUCTURE 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			
LUMINAIRE	Wattage of Luminaire		
	Voltage of Luminaire		
	Weight of Luminaire (Not To Exceed 60 lbs.)		
	Luminaire Effective Projected Area (EPA)		
	Luminaire Housing Finish Color (Gray, Black, Bronze)		
MOUNTING METHOD	<input type="checkbox"/> Post-Top <input type="checkbox"/> Side-Arm <input type="checkbox"/> Swivel-Tenon		
	Tenon Nominal Pipe Size (NPS)		
LENS:	<input type="checkbox"/> Flat <input type="checkbox"/> Sag / Drop <input type="checkbox"/> Teardrop <input type="checkbox"/> Prismatic Acorn/Traditional		
IES FORWARD DISTRIBUTION TYPE	<input type="checkbox"/> I <input type="checkbox"/> II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VS		
IES LATERAL DISTRIBUTION TYPE	<input type="checkbox"/> Very Short <input type="checkbox"/> Short <input type="checkbox"/> Medium <input type="checkbox"/> Long <input type="checkbox"/> Very Long		
DRIVER	Variable Output: (Specify Current Output Setting in mA)		
	Minimum Available Output		
	Maximum Available Output		
	Dimmable	0-10 Volts	
ELECTRICAL IMMUNITY	Minimum Requirements For Surge Suppression	10 KV / 10 KA	
PHOTOCONTROL	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
WARRANTY	Minimum Warranty Requirement	10 Years	
PERFORMANCE CRITERIA: LED LUMINAIRE			
NOMINAL CCT	Rated Correlated Color Temperature (3000K)		
LIGHT LOSS FACTOR	(LDD + Projected Lumen Depreciation @ 100,000 HRS in 25°C Ambient Temperature)		
PHOTOPIC ² DOWNWARD LUMINAIRE OUTPUT	<i>Initial</i> Luminaire Output Below Horizontal		
	Minimum <i>maintained</i> Luminaire Output Below Horizontal		
BUG RATING:	Max. Nominal Backlight-Up light-Glare ratings		
ANSI VIBRATION TEST LEVEL	Level 1 (Normal) Level 2 (Bridge/Overpass)		
THERMAL ENVIRONMENT	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 UNDERPASS STYLE LUMINAIRES OR APPROVED EQUAL.

1. HOLOPHANE LIGHTING (TUNNELPASS SERIES)

BASIS OF PAYMENT

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

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