

APPLICATION

THE LED UNDERPASS STYLE LUMINAIRE MAY BE USED FOR:

- A. NEW INSTALLATION OF UNDERPASS STYLE LUMINAIRES ON NEWLY CONSTRUCTED SUPPORTS AS PER PLAN.
- B. REPLACING EXISTING HID UNDERPASS LUMINAIRES ON EXISTING SUPPORTS WHERE SPACING REMAINS UNCHANGED.

LED UNDERPASS GENERAL REQUIREMENTS

- A. CORRELATED COLOR TEMPERATURE (CCT): 3000K.
- B. COLOR RENDERING INDEX (CRI): MINIMUM 70
- C. AMBIENT OPERATING ENVIRONMENT: -40°C TO +40°C (-40°F TO 104°F)
- D. VOLTAGE: 480V, 120V, OR AS SPECIFIED BY THE CITY OF COLUMBUS.
- 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.
- F. LUMINAIRE SHALL NOT WEIGH MORE THAN 43 POUNDS
- G. LUMINAIRE SHALL NOT HAVE AN EPA GREATER THAN 3.2 SQ. FT.
- H. LUMINAIRE TO HAVE AN IP-66 RATING.

HOUSING ASSEMBLY

- A. THE HOUSING SHALL BE CONSTRUCTED OF DIE-CAST ALUMINUM AND SHALL BE RUST RESISTANT.
- B. NO PARTS SHALL BE CONSTRUCTED OF POLYCARBONATES
- C. THE HOUSING SHALL BE EQUIPPED EITHER OF THE FOLLOWING WIRE ENTRY METHODS.
 - 1. A SINGLE 3/4-NPT TOP ENTRY SO THE LUMINAIRE CAN BE INDIVIDUALLY MOUNTED.
 - 2. TWO 3/4-NPT SIDE ENTRIES SO THE LUMINAIRE CAN BE MOUNTED IN A CONTINUOUS ROW AND ACCOMMODATE THROUGH-WIRING.

DOOR ASSEMBLY

- A. DOOR ASSEMBLY SHALL HAVE A STAINLESS STEEL LATCHED DOOR CLOSURE TO DISENGAGE THE TOP ELECTRICAL COVER FOR EASY ACCESS TO THE LED DRIVER, SURGE PROECTOR, QUICK DISCONNECT(S) AND TERMINAL BLOCK.
- B. DOOR ASSEMBLY SHALL HAVE A BOROSILATE GLASS REFRACTOR.

PAINT FINISH

- A. PAINT FINISH SHALL BE POWDER COATED AS DIRECTED BY THE CITY OF COLUMBUS DIVISION OF POWER.
- B. THE PAINT FINISH SHALL ACHIEVE A SCRIBE CREEPAGE RATING OF (10) PER ASTM D 1654 AFTER 20,000 HOURS OF TESTING PER ASTM B117.
- C. 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 UV TESTING AT ASTM G154 CYCLE 6.

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. GENERAL REQUIREMENTS
 - 1. LED DRIVER SHALL BE MOUNTED INSIDE THE HOUSING, REPLACEABLE, AND SHALL BE PRE-WIRED TO 480V, 120V, OR AS SPECIFIED AND READY FOR INSTALLATION.
 - 2. DRIVER AND LED ARRAYS SHALL BE DESIGNED FOR MULTI-CURRENT INPUT OPERATIONS WITH 0-10V DRIVER ADJUSTABLE OUTPUT.
 - 3. 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.

MIS-804	DEPARTMENT OF PUBLIC UTILITIES - DIVISION OF POWER CITY OF COLUMBUS, OHIO		
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4. WIRING INSIDE THE HOUSING SHALL COMPLY WITH 600V/105°C RATING OR HIGHER.
5. OUTPUT OPERATING FREQUENCY MUST BE \geq 120HZ AND INPUT OPERATING FREQUENCY OF 60 HZ. THE LED DRIVER SHALL BE RoHS COMPLIANT.
6. 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.

LED SURGE PROTECTION DEVICE

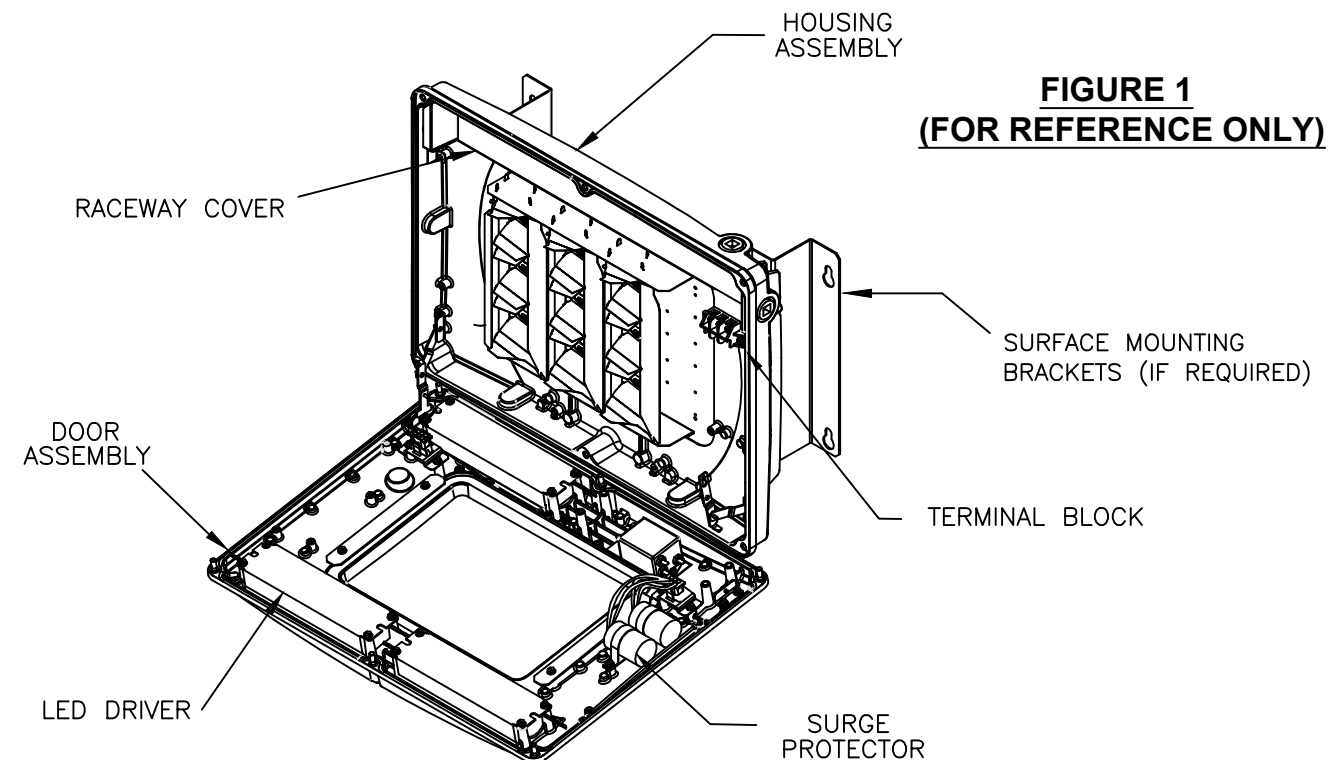
- A. THE SURGE PROTECTION DEVICE SHALL COMPLY WITH ANSI C136.37, ANSI/IEEE C62.41.2.
- B. EACH SURGE PROTECTION DEVICE SHALL BE INTERNALLY MOUNTED INSIDE THE HOUSING AND SPECIFIED FOR 480V, 120V OR AS SPECIFIED.
- C. THE SURGE PROTECTION DEVICE SHALL HAVE A MINIMUM 10 KV/5KA SURGE PROTECTION.
- D. THE SURGE PROTECTION DEVICE SHALL BE A UL 1449 4TH TYPE 4 RECOGNIZED COMPONENT FOR USE IN TYPE 2 LOCATIONS.

LED MODULE / ARRAY REQUIREMENTS

- A. LED MODULE(S) / ARRAY(S) SHALL DELIVER A MINIMUM OF 70% OF INITIAL LUMENS WHEN INSTALLED FOR 100,000 HOURS AND MEET L70 STANDARDS. LESS THAN THIS VALUE WILL BE CONSIDERED A LUMINAIRE , AND SUBJECT TO REPLACEMENT UNDER THE MANUFACTURER'S 10 YEAR WARRANTY.
- B. LIGHTING DISTRIBUTION SHALL BE IN ACCORDANCE WITH "IESNA LIGHTING DISTRIBUTIONS" AS PER RP-08 (latest version).
- C. LLD, LDD, AND LLF CALCULATIONS
 1. LAMP LUMEN DEPRECIATION FACTOR SHALL BE SUPPORTED BY TM-21 DATA @ 25°C FOR 50,000 HOURS. IT IS THE RESPONSIBILITY OF EACH MANUFACTURER TO PROVIDE A CALCULATION OF LAMP LUMEN DEPRECIATION (LLD).
 2. LUMINAIRE DIRT DEPRECIATION (LDD) SHALL BE 0.90 FOR GLASS OPTICS.
 3. 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.

4. 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.

- D. OPTICAL SYSTEM COMPONENTS SHALL BE RATED AT IP66 TO PROTECT AGAINST WATER, DIRT, AND INSECT INFILTRATION, AND BE RoHS COMPLIANT.
- E. THE LUMINAIRE SHALL CONTINUE TO OPERATE AND MAINTAIN THE MINIMUM OPTICAL PERFORMANCE CRITERIA FOR THE PARTICULAR APPLICATION IN WHICH IT IS INSTALLED. 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".
- F. LUMINAIRE CIRCUITRY SHALL INCLUDE QUICK CONNECT / DISCONNECT FOR EASY SEPARATION. SEE FIGURE 1.



**FIGURE 1
(FOR REFERENCE ONLY)**

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INTERNAL LABELING

A. A VISIBLE LABEL SHALL BE ATTACHED TO THE INSIDE SURFACE OF EACH LUMINAIRE HOUSING. THE INTERNAL LABEL SHALL MEET THE REQUIREMENTS OF ANSI C 136.22. THE LABEL SHALL INCLUDE THE FOLLOWING:

- MANUFACTURER'S NAME - LUMINAIRE TYPE, AND CATALOG NUMBER
- MONTH AND YEAR OF MANUFACTURE
- LINE INPUT VOLTAGE AND WATTAGE
- FREQUENCY IF OVER 60 HERTZ
- DESCRIPTIVE WIRING DIAGRAM SHOWING INPUT TERMINALS, DRIVER, AND LED ARRAY

EXTERNAL NEMA LABELING

- A. AN EXTERNAL NEMA LABEL SHALL INSTALLED ON THE LUMINAIRE, AND BE ORIENTED SO THAT IT CAN BE CLEARLY IDENTIFIED FROM GROUND LEVEL.
- B. THE LABEL SHALL BE PER ANSI C136 AND INDICATE THE EXACT WATTAGE OF THE LUMINAIRE.

INSTALLATION

- A. THE LUMINAIRE SHALL BE INSTALLED AS SHOWN ON THE PLANS AND AS PER THE MIS SPECIFICATIONS. ORIENTATION AND LEVELING OF THE UNITS SHALL BE SO AS TO PROVIDE FOR UNIFORM APPEARANCE, MAXIMUM LIGHTING EFFICIENCY AND EASE OF MAINTENANCE.
- B. ALL EXTERNAL FASTENERS SHALL BE STAINLESS STEEL. A MINIMUM OF FOUR HEX HEAD STAINLESS STEEL BOLTS SHALL BE USED TO MOUNT THE HOUSING TO THE WALL OR SUPPORT STRUCTURE.
- C, TWO HOUSING MOUNTING METHODS SHALL BE ALLOWED:
 - 1. FLUSH-MOUNT THE HOUSING DIRECTLY ONTO THE VERTICAL SURFACE.
 - 2. USE FIXED WALL-MOUNT BRACKETS.
- D. THE LUMINAIRE SHALL NOT EXTEND MORE THAN 12" FROM THE WALL / SUPPORT, AND SHALL BE INSTALLED AT THE HEIGHT INDICATED ON THE PLANS.

WARRANTY

- A. 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 BY THE DIVISION OF POWER.
- B. NEGLIGIBLE LIGHT OUTPUT FROM MORE THAN 10 PERCENT OF THE LED PACKAGES CONSTITUTES LUMINAIRE FAILURE.

TESTING / CERTIFICATION / STANDARDS / RECOMMENDED PRACTICES

THE LUMINAIRE SHALL COMPLY WITH THE FOLLOWING STANDARDS:

- A. ANSI C136:31 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 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 H. ANSI C136.41 I. ANSI C136.37 J. ANSI C136.22 K. IEC 60529
- L. IEEE C62.41.2 M. IESNA TM-15 N. RoHS O) ANSI C136.10 P. ANSI C78.377
- Q. TM-21 R. ASTM D1654 S. IES LM-79 T) UL 1449 (Surge Protection DeviceS)
- U. IEC 6100 - ELECTROMAGNETIC COMPATIBILITY V, ANSI C82.77 HARMONIC DISTORTION

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.

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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.

BASIS OF PAYMENT

ITEM	UNIT	DESCRIPTION
MIS-804	EACH	LUMINAIRE, LED, UNDERPASS

SUBMITTALS

A. THE FOLLOWING ITEMS SHALL BE INCLUDED IN THE SUBMITTAL PACKAGE:

- 1. LUMINAIRE SUBMITTAL FORM (SEE SHEET 5)
- 2. LUMINAIRE CUT SHEET
- 3. LED DRIVER CUT SHEET
- 4. LM-79 TEST REPORT
- 5. TM-21 TEST REPORT
- 6. LUMINAIRE THERMAL TEST REPORT
- 7. MANUFACTURER'S TEN (10) YEAR WARRANTY DOCUMENTATION

B. LM -79 DATA AND TM-21 TEST REPORTS MUST REFLECT THE EXACT CCT, WATTAGE AND VOLTAGE OF THE LUMINAIRE TO BE SUPPLIED. NO PRO-RATED TEST REPORTS WILL BE ACCEPTED.

C. THE LUMINAIRE THERMAL TEST REPORT MUST REFLECT THE EXACT WATTAGE AND VOLTAGE TO BE SUPPLIED. NO PRO-RATED TEST REPORTS WILL BE ACCEPTED.

SUGGESTED MANUFACTURERS

A. THE FOLLOWING ARE SUGGESTED UNDERPASS STYLE LUMINAIRES FOR USE IN THE CITY OF COLUMBUS.

- 1. HOLOPHANE LIGHTING (TUNNELPASS SERIES)

B. A SUGGESTED LUMINAIRE HAS BEEN PREVIOUSLY USED BY THE CITY OF COLUMBUS, AND SHALL BE USED AS THE BASIS OF DESIGN FOR THE PROJECT IN WHICH THIS SPECIFICATION IS APPLICABLE.

C. SHOULD THE CONTRACTOR CHOOSE TO SUBSTITUTE THE BASIS OF DESIGN, THE CHOSEN LUMINAIRE MUST MEET ALL TARGET ILLUMINATION CRITERIA AS SPECIFIED BY THE PROJECT. NO MORE THAN A 10% INCREASE IN THE ACTUAL WATTAGE OF THE LUMINAIRE USED AS THE BASIS OF DESIGN WILL BE ALLOWED. THE SUBSTITUTED LUMINAIRE MUST MEET AND COMPLY WITH ALL ITEMS IN THIS SPECIFICATION.

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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	
	Luminaire Effective Projected Area (EPA)	
	Luminaire Housing Finish Color	
MOUNTING METHOD	<input type="checkbox"/> Post-Top <input type="checkbox"/> Side-Arm	
	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 Required)	YES / NO
ELECTRICAL IMMUNITY	Surge Suppression Installed (Minimum 10 KV / 5 KA)	
PHOTOCONTROL	Photo-control Receptacle Style	7-PIN <input type="checkbox"/> YES
		TWIST-LOCK <input type="checkbox"/> YES
	Long Life Photo-control	7-PIN Compatible <input type="checkbox"/> YES <input type="checkbox"/> NO
	Shorting Cap Included	<input type="checkbox"/> YES <input type="checkbox"/> NO
WARRANTY	Minimum 10 Year All-Inclusive (Full Replacement) Warranty	<input type="checkbox"/> YES <input type="checkbox"/> NO
PERFORMANCE CRITERIA: LED LUMINAIRE		
NOMINAL CCT	Rated Correlated Color Temperature (3000K)	<input type="checkbox"/> YES <input type="checkbox"/> NO
LIGHT LOSS FACTOR	(LDD + Projected Lumen Depreciation @ 100,000 HRS in 25°C Ambient Temperature)	
PHOTOPIC² DOWNWARD LUMINAIRE OUTPUT	<i>Initial</i> Lumen Output Below Horizontal	
	Maintained Lumen Output Below Horizontal (From LM-79 Test)	
	Minimum <i>maintained</i> Luminaire Output Below Horizontal	
BUG RATING:	Backlight-Up light-Glare Rating	
ANSI VIBRATION TEST LEVEL	Level 1 (Normal) Level 2 (Bridge/Overpass)	
THERMAL ENVIRONMENT	Minimum Ambient Operating Temperature	
	Maximum Ambient Operating Temperature	

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