MICHIGAN

DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

FOR

**LUMINAIRE, ROADWAY FOR JOB NUMBER 210054**

UTL:BMB 1 of 3 APPR:RPB:DBP:06-22-23

**a. Description.** This work consists of furnishing and installing luminaires as shown in the contract. Ensure all work is in accordance with the standard specifications, the *NEC*, as specified herein, and as noted on the plans.

**b. Materials.** Furnish luminaire assemblies by one of the following pre-approved Manufacturers meeting all *ANSI/NEMA/UL/IES* applicable codes, including the following requirements:

1. Towers/Median:

• CREE OSQ

• Holophane HMAO LED3

• Streetworks Galleon

• Lumecon Detroit series LLC

2. Ramps/Round-a-bouts:

• CREE XSP2

• Holophane Autobahn

• Streetworks NVN Navion

• Lumecon Detroit series LLC

Ensure the entire luminaire assembly including the housing, driver, and optical components, is manufactured and assembled in the United States of America. Ensure the luminaire housing and optical assembly are provided by the same manufacturer.

Ensure luminaire housing is *Independent Electrical Contractors* *(IEC) Ingress Protection 66* rated, die-cast aluminum construction with stainless steel or zinc plated steel fastening hardware. Ensure the fixture is a grey or silver powder-coat finish unless otherwise shown in the contract. Furnish a mast arm horizontal tenon mounting provision with ±5 degree leveling adjustment capable of mounting on a 2 inch (2⅜ inch outside diameter) pipe arm (if required). Ensure the fixture has passive heat sink cooling (no fans, pumps, etc.) with self-cleaning ability and designed to operate within a -40 °F to 140 °F ambient temperature environment.

Furnish the luminaire optical assembly with a color temperature between 4000 kelvin (K) and 5000 K, with a color rendering index (CRI) of 70 or greater and with an *IES* photometric distribution as specified in the contract. Ensure the luminaires’ driver is solid state type (*ANSI/NEMA/American Nation Standard Lighting Group {ANSLG} C78.377*) with built-in overload and voltage surge protection. Ensure the driver has a 90 percent or greater power factor with less than 20 percent total harmonic distortion at full load and input voltage as shown in the contract. Ensure the drivers have a minimum rated useful life of 100,000 hours and comply with *FCC 47 CFR part 15* non-consumer rules and regulations.

Furnish luminaires with a minimum 10 kilovolt (kV)/10 kiloampere (kA) replaceable internal surge suppression module meeting *UL* *1449*/*ANSI C62.41.2* *Category C*, high exposure requirements. Ensure the luminaire power supply, driver, optical assembly, and surge suppression module is field serviceable and upgradable by means of modular electrical connections and easy access mounting hardware. Install luminaire busman fusing inside pole base handhole as shown on detail sheet.

Ensure the luminaire conforms with *ANSI C136.31/37* for 3G rating of vibration for bridge and overpass applications, *ASTM B117* for Salt Spray (Fog) testing (Minimum 3000 hours) and *IES TM-15* for Backlight, Uplight and Glare (BUG) ratings, without resorting to additional shields being attached to luminaire housing.

Ensure the luminaire delivers 90 percent or greater initial delivered lumens after 50,000 hours of operation and has a 70 percent or greater lumen maintenance after a minimum of 100,000 hours rated life. Furnish the Engineer the luminaire life expectancy rating (L70), manufacturer’s documentation and photometric data per *IES-LM-80* calculated at an ambient temperature of 25 °C, by a third party independent test lab recognized by the Department of Energy as qualified to conduct photometric testing per *IES LM-79*.

Ensure the luminaire has a minimum 10 year manufacturer’s written warranty covering luminaire assembly, electrical components, driver, mechanical components and paint finish.

The Engineer reserves the right to request standard production model fixture samples for inspection and to require such tests as deemed necessary to ensure complete compliance with the specifications. Luminaires that do not meet these tests or those luminaires with improper or inadequate light distribution are subject to rejection. All costs associated with submitting and testing of replacement luminaires or lamps due to rejection of submitted luminaires are the responsibility of the Contractor.

**c. Construction**. All new installations must have luminaires provided as shown in the contract. Examine all luminaires delivered to the jobsite prior to installation to ensure all specification requirements and shop drawing comments have been incorporated by the manufacturer. Ensure luminaires are individually packed for shipment in such a way as to ensure arrival at their destination in an undamaged condition.

Furnish shop drawings showing luminaire type, driver specification sheets and photometric calculations. Submit as complete package.

Ensure all luminaire assemblies are provided by one manufacturer. Any proposed luminaire must achieve the photometric levels and uniformity ratios per *IES LM-79* for the fixture spacing as shown in the contract. Submit project specific point by point lighting footcandle calculations by an independent third party testing lab, meeting the following design criteria:

Ensure candle power distribution is accordance with the *2018 AASHTO Roadway Lighting Design Guide* criteria as follows: Average maintained illumination level of at least 1.0 footcandle and minimum maintained illumination level of at least 0.2 footcandles with a uniformity ratio (Average/Minimum Footcandles) not exceeding 4:1.

Roundabouts and Single-Point Urban Interchanges (SPUI’s): Average maintained illumination level of at least 2.0 footcandle and minimum maintained illumination level of at least 0.5 footcandles with a uniformity ratio (Average/Minimum Footcandles) not exceeding 4:1. Ensure the road surface classification is “R3” unless otherwise noted, with the light loss factor determined by manufacturer’s lumen maintenance depreciation calculated at 55,000 hours (~12 years dusk-to-dawn operation), lumen dirt depreciation of 0.90. (LLF=LM\*0.90)

Ensure luminaries are oriented to provide optimum designed light level distribution on the roadway.

Clean the luminaire reflector and glassware after installation is complete. Ensure cleaning is done in accordance with the luminaire manufacturer’s recommendations.

Furnish manufacturer’s calculations and supporting test data indicating lumen maintenance life and product warranty documentation to the Engineer. Ensure final photometric calculations are based on lumen photopic values, scotopic lumen values are not recognized.

**d. Measurement and Payment**. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

**Pay Item Pay Unit**

Luminaire, Median Each

Luminaire, Ramp Each