REVISIONS		
REV. NO.	DESCRIPTION	DATE
	Various	09/05/2018

General Specifications For Luminaires:

Description

The luminaire shall be a horizontal or vertical burning as applicable, high intensity discharge, outdoor luminaire complete with housing, appropriate mounting, built in ballast, Mogul socket, lamp, gasketed, reflector and glass refractor, unless otherwise specified.

Materials:

Lamp:

1. The high-intensity discharge lamp shall be of the size and type specified in the plans.
2. The lamp base shall be nickel plated brass with a date coding feature.
3. The lamp shall be capable of starting 90% of the time at -29 C.

Mounting:

1. Luminaires for mast arm mounting shall be equipped with a Slip fitter designed to accept 1-¼" to 2" schedule 40 pipe and provide a method of leveling the luminaire and vertical adjustments ± 5 degrees using externally accessible bolts. The Slipfitter shall be equipped with a pipe stop.
2. Luminaires for post top mounting shall be equipped with a Slipfitter designed to accept a 2-⅜" to 3" O.D. pole or Tenon and shall be equipped with leveling screws.

Gaskets:

1. The gaskets shall be made of heat resistant nonmoisture absorbing polyester, silicon rubber or dacron felt. The gasket shall be continuous or one piece and installed with no butt ends or gaps.

Lamp Socket:

1. The lamp socket shall be a completely porcelain enclosed nickel plated brass mogul type shell with internal lamp grips to assure electrical contact under conditions of normal vibration and resist the removal of the lamp. The socket shall have welded internal connections, and be in compliance with the latest revision of EEI publication no. TDJ-147.

Socket Support:

1. The socket support shall contain identifying marks so the socket may be easily adjusted, both horizontally and vertically to provide the specified IES light distribution.

Ballast:

1. Ballasts shall be bobbin wound and have a high power factor (90% or better), be capable of operating the high intensity discharge lamp specified from a single phase, grounded, 480 volt nominal, multiple system, unless otherwise specified. The ballast, capacitor and starting aid, if required, shall be prewired to the lamp socket and terminal board and be modular constructed and designed for easy removal and installation by using quick disconnect features. The ballast shall be designed to start the lamp at -29 C (mercury) or at -35 C (high pressure sodium). For luminaires used in conjunction with traffic signals, the ballast shall be designed for 120/240 volt operation.
2. High pressure sodium ballast shall be a constant wattage or magnetic regulator type capable of operating the lamp within the limits defined by ANSI standards with ± 10% line voltage variation. Arc tube voltage shall be 100 volt design.

Terminal Board:

1. The terminal board shall be of phenolic resin, molded plastic or porcelain with protective barriers between terminals. The screw terminals shall be captive type, compatible with aluminum or copper conductors and capable of accepting up to a No. 6 AWG conductor.

Electrical:

1. All electrical components shall be insulated to a minimum of 10 KV BIL.
2. Termination connectors shall meet or exceed twice the rated current value for EEI-TDJ162 Class A Heat Cycle Test.
3. All wire shall be UL approved and the insulation capable of withstanding the designed operating temperatures of the luminaire.

Hardware:

1. All nuts bolts, screws, clips, washers, springs and attaching hardware shall be fabricated from non-corrosive alloys. Cadmium plating will not be considered adequate weather proofing. All threaded surfaces used in aluminum housing shall be lubricated with silicone grease.

Finish:

1. Unless otherwise specified, the luminaire shall have a light grey baked-on enamel finish, similar to the Munsell #5BG-ASA#70.

Photo Cell and Receptacle:

If specified, the luminaire shall be equipped with the following:

1. The photoelectric control shall be a hermetically sealed cadmium sulfide photocell, detachable type, 105-285 volt, 50/60 hertz ac, outdoor control complete, in accordance with EEI-NEMA standards, relay load contracts rated 1000 watts or 1800 volt-ampere reactive, single-pole, single-throw contact, normally closed for "fail safe" operation, enclosed positive lightning and surge protection, housed in a high impact acrylic housing which has a base plate gasket and 3-pole polarized twist-lock plug. Turn-on shall occur at one foot candle and turn-off at 5 foot-candles approximately.
2. The three pole locking receptacle shall be in accordance with the latest EEI and NEMA standards and be prewired to the terminal board.

Miscellaneous:

1. Each luminaire shall be supplied with a permanently attached name plate inside the housing and/or on the ballast. This label shall indicate the manufacturer, catalog no., lamp type, wattage, line voltage rating and connection diagram.
2. Each luminaire may be marked in accordance with EEI-NEMA standards for "Field Identification of High-Intensity Discharge Lamps in Luminaires used in Roadway Lighting Equipment" EEI Pub. No. TDJ-150 and NEMA Pub. No. 0D150.
3. Following the installation of the high mast and post top (offset design) luminaires, aiming shall be under the direction of the highway lighting engineer.

Photometric Data:

1. The luminaire manufacturer shall furnish photometric data for alternative fixture or light levels not contained on the standard for approval.
2. The photometric data shall be in accordance with the uniform computer input format specified in the latest edition of the "IES Approved Method for Photometric Testing of Roadway Luminaires and the IES TM-15-07(revised) Backlight, Uplight; Glare (BUG) rating."

Testing:

1. If requested, a sample luminaire and lamp of each type and size shall be supplied for testing purposes.

Certification:

1. The luminaire and/or lamp manufacturer shall provide a Type "D" certification in accordance with Subsection 106.4C of the "2009 Standard Specifications for Highway Construction."

Additional Individual Luminaire Specifications For High- Intensity Discharge Luminaires

Description:

Luminaires shall comply with the general specifications for high intensity discharge luminaires stated on this standard, and the following specifications:

Roadway Luminaires (General):

1. Housing:
   The housing shall be precision die-cast aluminum and be of adequate size to contain the ballast components, reflector lamp and socket, terminal board, Slipfitter and allow all the electrical components to operate within their designed temperature range. The housing shall be designed to accommodate at least a 400 watt high pressure sodium lamp.
2. Reflector:
   The reflector shall be of specular finished, hydro-formed, anodic coated aluminum with a minimum coat thickness of 0.00015 inches and weighing 7.5 milligrams per square inch to provide a minimum reflectivity of 82%, the reflector shall have a reverse flange and mounted within the housing to assure a firm surface for proper gasket sealing when the refractor door is closed.
3. Refractor:
   The refractor shall be pressed , heat resistant, crystal clear borosilicate glass, annealed, homogenous and free from imperfections and striations. Refracting prisms shall be incorporated in the refractor to assure maximum utilization of the light generated and provide the required photometric distribution.
4. Door:
   The refractor door shall be precision die-cast aluminum with clips for proper positioning of the refractor. The door shall be easily detached from the housing by operating the spring loaded latch or latches and separating the hinge halves while wearing linemen's gloves.
5. Ballast:
   The ballast shall be door mounted on all luminaires 400 watt or less.
6. The optical performance of all luminaries shall conform to IES TM-15-07 (revised) standards for maximum zonal lumens for BUG using IES testing procedures.

Roadway Luminaire (Cutoff Design)

1. Refractor:
   The refractor shall be flat stripped heat and impact resistant glass.
2. Distribution control: Per IES TM-15-07 (revised) BUG rating.

Additional Individual Luminaire Specifications For Light Emitting Diode Luminaires

Description:

Luminaires shall comply with Specification Section 809 for Light Emitting Diode Luminaires (Latest Revision) and the following specification requirements.

LED Luminaires (General Requirements)

1. Provide LED luminaires listed to UL1598 and suitable for use in wet locations. Ensure that optical compartment meets IEC STD. 60529-IP66. Supply NRTL certification to verify listing. Do not place fuses in pole-mounted luminaires. Provide wall- or underpass-mounted luminaires with internal 10-amp, time delay fuses and fuse holders.
2. Housing reflector, refractor, and door shall be constructed from 96% copper free diecast aluminum. Provide for luminaire mounting to a 1¼ in. pipe arm, capable of adjustments 0 - 45 degrees from level. Meet ANSI 136.31, 3.0 G vibration requirements. Equip luminaire with a three-prong ANSI 136.10 rotatable and shorting cap. Ensure weight of the luminaire is less than 60 LB. and the effective projected area is less than 2.1 SQ. FT.
3. Mounting: Attach a level indicator to the fixture housing. Ensure that indicator is sensitive to 1 degree changes in position at any point within 5 degrees of the level position. Ensure that indicator is clearly visible from the ground up to a 40-ft. mounting height. Ensure that indication of level corresponds to a level of fixture housing.
4. LED drivers. Provide luminaire with replaceable LED driver that will operate at 120 v, 240 v, or 480 v line voltages as shown in the plans. Provide LED drivers meeting the performance specifications described in Specification Section 809 for Light Emitting Diode Luminaires.
5. LED optical assembly: Provide LED optical assembly with nominal color temperature of 4000K. For verification testing, CCT within the range of 3700K to 4300K is allowable. Provide LED optical assembly with a minimum CRI (Color Rendering Index) of 70. Provide a passive thermal management system. Do not use fans or other mechanical cooling systems.
6. Finish: Paint luminaires light gray with initial gloss of 30-60% (semi-gloss) when installing on galvanized poles. For all other poles, paint luminaires to match the color of the pole as directed. Use a thermoset powder-coat paint system. Provide ASTM testing documentation that meets the painting performance requirements set forth in Specification Section 809 for Light Emitting Diode Luminaires.
7. The optical performance of all luminaries shall conform to IES TM-15-07 (revised) standards for maximum zonal lumens for BUG using IES testing Procedures.

Typical Lamp Schedule						
High-Intensity Discharge Lamp Types				LED Type		
Nominal Lamp Wattage	High Pressure Sodium			Light Emitting Diode		
	Color	Nominal Lumens	Rated Avg. Life, Hrs.	Color	Nominal Lumens	Rated Avg. Life, Hrs.
100	CL	9,500	20,000	4000k	6,000	70,000
	Coated	8,800	20,000	4000k	6,000	70,000
200	CL	22,000	24,000	4000k	10,000	70,000
250	CL	27,500	24,000	4000k	14,000	70,000
	Coated	26,000	24,000	4000k	14,000	70,000
310	CL	37,000	24,000	4000k	17,000	70,000
400	CL	50,000	24,000	4000k	22,000	70,000
	Coated	47,500	24,000	4000k	22,000	70,000
1000	CL	140,000	24,000	-	-	-

Typical Lamp Schedule

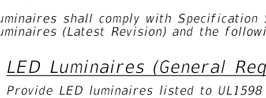
Legend For "Luminaires"

(_____ -(_____ - _____ - _____ - _____ - _____ - _____ - _____)

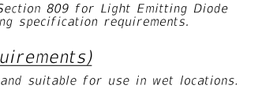
Lamp Watt - Lamp Type - Lamp Color - Lumens - Vert. Dist. - Lateral Dist. - Distribution Control - Style

Lamp Watt	100, 250, 310, 400, 1000, Etc...
Lamp Type	HPS = High Pressure Sodium LED = Light Emitting Diode
Lamp Color	CL = Clear CI = Color Improved CCT = Color Temperature (LED Only)
Nominal Lamp Lumen Rating	9,500/22,000/27,5000/37,000/50,000/ 140,000/Etc...
Vertical Distribution	S = Short M = Medium L = Long
Lateral Distribution	Type 1, 2, 3, 4, 5
Distribution Control	BX-UX-GX; B=Blacklight, U=Uplight; G= Glare (X = 0, 1, 2, 3, 4, 5)
Style	A1 = Standard Design A2 = Cutoff Design A3 = LED Design

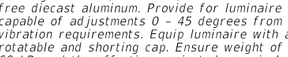
Legend For Luminaires



Style A1
(Standard Design)



Style A2
(Cutoff Design)



Style A3
(LED Design)

Legend For Luminaires

Approved By
Bridge Engineer: _____ Date: 9-14-18

Approved By
Traffic Engineer: _____ Date: 9/28/18

DOT

Traffic Standard

Typical Highway Luminaire Details

2009 Specifications

HLD1-2	01

T-314