Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

July 29, 2024

Cathy Kendall
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: 992
Proposed Specification: **9920102 Highway Lighting Materials**

Dear Ms. Kendall:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Richard Stepp to update color temperature language and add aluminum conductor options. Warranty was also increased to 10 years.

Please review and transmit your comments, if any, within two weeks (10 business days). Comments should be sent via email daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at (850) 414-4130.

Sincerely,

Signature on File

Daniel Strickland, P.E.
State Specifications Engineer

DS/dh
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

HIGHWAY LIGHTING MATERIALS.
(REV 4-18-24)

SUBARTICLE 992-1.2 is deleted and the following substituted:

992-1.2 Luminaires, Driver, etc.: All luminaires shall be one of the products listed in the Department's Approved Product List (APL). Manufacturers seeking evaluation of their product shall submit an application and sample luminaire in accordance with Section 6.

The light source for luminaires shall be either light emitting diodes (LED), magnetic induction or plasma induction.

The luminaire housing shall be constructed of precision cast aluminum with a corrosive resistant polyester powder coat finish. The standard color shall be gray. The housing shall have an electrical terminal block to attach the luminaire cable and a hinged door which provides direct access to internal parts. Hinged doors are not required for high mast luminaires and underdeck luminaires. All hardware on the exterior of the housing shall be stainless steel. The refractor and lens shall consist of glass or an optical grade polymer. The manufacturer shall place a permanent tag in the luminaire housing imprinted with: the manufacturer name, luminaire voltage, lamp wattage, and provide a blank area for the Contractor to inscribe the installation date.

Luminaires shall meet the following requirements: UL 1598 listed and labeled for installation in wet locations by an OSHA recognized "Nationally Recognized Testing Laboratory" (NRTL), be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80) and have IESNA light distribution curves (IES LM-79) by an EPA recognized laboratory.

The driver shall be rated for 100,000 hours and have a power factor greater than or equal to 90% at full load with a total harmonic distortion less than or equal to 20% at full load. The fixture shall accommodate a circuit voltage of 480V.

Luminaires shall be provided with a minimum 10kV/10kA internal surge suppression module meeting UL 1449/ANSI C62.41.2 Category C.

The manufacturer shall submit a ~~five~~ten-year non-prorated full warranty on all components of the luminaire to the Department. The warranty shall begin on the date the luminaire is shipped from the vendor. ~~project acceptance date and include all components of luminaire.~~

SUBARTICLE 992-1.3 is deleted and the following substituted:

992-1.3 Conductors: All conductors shall be color-coded stranded copper meeting the requirements of NEMA WC 70. All conductors shall be tested and listed by a NRTL. Where specified in the Plans, aluminum conductors may be substituted for copper conductors.

Service and circuit conductors shall be single-conductor cable Type THWN-2 and shall not be smaller than No. 6 AWG unless specified elsewhere in FDOT publications.

Bonding ground conductor shall have a green jacket and shall not be smaller than No. 6 AWG.

SUBARTICLE 992-1.7 is deleted and the following substituted:

992-1.7 Conductor Splices: Unless otherwise shown in the Standard Plans or authorized by the Engineer, splices shall meet the following requirements:

a. Copper Splices: Use ~~be made with~~ compression sleeves or split bolt connectors. The connector ~~shall~~must be coated~~sealed~~ in ~~silicone~~oxide inhibitor gel per the manufacturer's instructions. ~~that easily peels away leaving a clean connection~~. This gel may be pre-filled in splice connectors or applied during installation. For split bolts, ~~T~~the gel shall be contained in a UV, impact, and abrasion resistant enclosure that, when snapped around the ~~split bolt~~connector, will provide a waterproof connection without the use of tools or taping.

b. Aluminum Splices: Use a splice connector type per the approval of the Engineer. The connector must be coated in oxide-inhibitor gel per the manufacturer's instructions. This gel may be pre-filled in splice connectors or applied during installation.

c. Dissimilar Metal Splices: In addition to the requirements for Aluminum Splices, use a connector type identified for differing conductor materials following the manufacturer's instructions. Conductors having dissimilar metals must not touch each other directly. Conductors also must not touch device terminals with dissimilar metals.

SUBARTICLE 992-2.4.1 is deleted and the following substituted:

992-2.4 Luminaires: Provide luminaires in accordance with the following requirements.

992-2.4.1 Luminaires for Conventional Lighting: Luminaires shall meet the following additional requirements:

a. ~~A~~ For APL qualification, the luminaire must have ~~maximum~~ correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A ~~(3985°K, plus or minus 275°K)~~. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slipfitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) arm or a pole top mounting assembly designed to accommodate a 2-3/8 inch pole top tenon.

For APL qualification, the manufacturer must have a fixture with an IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, meeting a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool with the following settings:

Table 992-1

Setting	Requirement
Roadway Standard	IES RP-8-18
R-Table	R3 (Q0=0.07)
Roadway Layout	Two Rows Opposite, With Median, 2R OPP w/M
Roadway Width	40 feet

Table 992-1	
Setting	Requirement
Median Width	22 feet
Number of Lanes in Direction of Travel	3
Driver's Side of Roadway	Right
Calculation Area	Bottom
Mounting Height	As per manufacturer's recommendation
Setback	12 feet
Tilt	0°
Optimization Criteria	Avg. Illuminance = 1.5 fc Avg./Min. Ratio = 4 Max./Min. Ratio= 10 Lv Max./L Avg. Ratio= 0.3
Arm Length	Pole top fixtures – as provided by the IES file Arm mounted fixtures – 12 feet

SUBARTICLE 992-3.2 is deleted and the following substituted:

992-3.2 Luminaires: The luminaires shall meet the following requirements.

a. A ~~maximum~~ correlated color temperature (CCT) of ~~4000~~3000°K meeting ANSI C78.377A (~~3985~~3045°K, plus or minus ~~275~~175°K).

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slip fitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) connection. For qualification, the manufacturer must have a fixture with a Type V IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, capable of providing photometrics similar to a 1000 W HPS fixture when mounted on 80 to 120 foot poles.

SUBARTICLE 992-5.1 is deleted and the following substituted:

992-5 Underdeck Lighting.

992-5.1 Luminaires: The luminaires shall meet the following requirements.

a. ~~A maximum correlated color temperature (CCT) of 4000°K meeting ANSI C78.377A (3985°K, plus or minus 275°K).~~For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 55 rating.

Underdeck fixtures shall be wall mounted fixtures.

ARTICLE 992-7 is deleted and the following substituted:

992-7 Luminaire Retrofit Kits for Conventional Lighting.

Luminaire retrofit kits shall meet the following requirements:

a. ~~The light source for luminaire retrofit kits shall be light emitting diodes (LEDs) meeting ANSI C78.377A with a maximum correlated color temperature of 4000ºK (3985ºK ± 275ºK).~~For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The luminaire retrofit kit shall be UL 1598C listed by an OSHA "Nationally Recognized Testing Laboratory" (NRTL).

c. The optics shall have an IP 66 rating. Submit testing report.

d. LEDs shall be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80). Submit testing report.

e. Luminaire retrofit kits shall have a IESNA light distribution curve (IES LM-79) designated by an EPA-recognized laboratory. Submit testing report.

f. Luminaire retrofit kits shall meet a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool in accordance with the settings shown in Sub-article 992-2.4. Submit IES file.

g. Luminaire retrofit kits shall have a driver rated for 100,000 hours with a power factor greater than or equal to 90% at full load and a total harmonic distortion less than or equal to 20% at full load. Submit driver information that documents these requirements, including the operational temperature of the driver at 25ºC.

h. Luminaire retrofit kits shall accommodate a circuit voltage of 480V.

i. Luminaire retrofit kits shall be provided with a minimum 10kV/10kA internal surge protection device (SPD) meeting UL 1449 and ANSI C62.41.2 Category C High. Submit SPD information that documents these requirements.

j. The manufacturer shall submit a ~~five~~ten-year non-prorated full warranty on all components of the luminaire retrofit kit to the Department. The warranty shall begin on the ~~project acceptance date and include all components of the luminaire retrofit kit.~~ date the retrofit kit is shipped from the vendor.

HIGHWAY LIGHTING MATERIALS.
(REV 4-18-24)

SUBARTICLE 992-1.2 is deleted and the following substituted:

992-1.2 Luminaires, Driver, etc.: All luminaires shall be one of the products listed in the Department's Approved Product List (APL). Manufacturers seeking evaluation of their product shall submit an application and sample luminaire in accordance with Section 6.

The light source for luminaires shall be either light emitting diodes (LED), magnetic induction or plasma induction.

The luminaire housing shall be constructed of precision cast aluminum with a corrosive resistant polyester powder coat finish. The standard color shall be gray. The housing shall have an electrical terminal block to attach the luminaire cable and a hinged door which provides direct access to internal parts. Hinged doors are not required for high mast luminaires and underdeck luminaires. All hardware on the exterior of the housing shall be stainless steel. The refractor and lens shall consist of glass or an optical grade polymer. The manufacturer shall place a permanent tag in the luminaire housing imprinted with: the manufacturer name, luminaire voltage, lamp wattage, and provide a blank area for the Contractor to inscribe the installation date.

Luminaires shall meet the following requirements: UL 1598 listed and labeled for installation in wet locations by an OSHA recognized "Nationally Recognized Testing Laboratory" (NRTL), be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80) and have IESNA light distribution curves (IES LM-79) by an EPA recognized laboratory.

The driver shall be rated for 100,000 hours and have a power factor greater than or equal to 90% at full load with a total harmonic distortion less than or equal to 20% at full load. The fixture shall accommodate a circuit voltage of 480V.

Luminaires shall be provided with a minimum 10kV/10kA internal surge suppression module meeting UL 1449/ANSI C62.41.2 Category C.

The manufacturer shall submit a ten-year non-prorated full warranty on all components of the luminaire to the Department. The warranty shall begin on the date the luminaire is shipped from the vendor.

SUBARTICLE 992-1.3 is deleted and the following substituted:

992-1.3 Conductors: All conductors shall be color-coded stranded copper meeting the requirements of NEMA WC 70. All conductors shall be tested and listed by a NRTL. Where specified in the Plans, aluminum conductors may be substituted for copper conductors.

Service and circuit conductors shall be single-conductor cable Type THWN-2 and shall not be smaller than No. 6 AWG unless specified elsewhere in FDOT publications.

Bonding ground conductor shall have a green jacket and shall not be smaller than No. 6 AWG.

SUBARTICLE 992-1.7 is deleted and the following substituted:

992-1.7 Conductor Splices: Unless otherwise shown in the Standard Plans or authorized by the Engineer, splices shall meet the following requirements:

a. Copper Splices: Use compression sleeves or split bolt connectors. The connector must be coated in oxide inhibitor gel per the manufacturer's instructions.. This gel may be pre-filled in splice connectors or applied during installation. For split bolts, the gel shall be contained in a UV, impact, and abrasion resistant enclosure that, when snapped around the connector, will provide a waterproof connection without the use of tools or taping.

b. Aluminum Splices: Use a splice connector type per the approval of the Engineer. The connector must be coated in oxide-inhibitor gel per the manufacturer's instructions. This gel may be pre-filled in splice connectors or applied during installation.

c. Dissimilar Metal Splices: In addition to the requirements for Aluminum Splices, use a connector type identified for differing conductor materials following the manufacturer's instructions. Conductors having dissimilar metals must not touch each other directly. Conductors also must not touch device terminals with dissimilar metals.

SUBARTICLE 992-2.4.1 is deleted and the following substituted:

992-2.4 Luminaires: Provide luminaires in accordance with the following requirements.

992-2.4.1 Luminaires for Conventional Lighting: Luminaires shall meet the following additional requirements:

a. For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slipfitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) arm or a pole top mounting assembly designed to accommodate a 2-3/8 inch pole top tenon.

For APL qualification, the manufacturer must have a fixture with an IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, meeting a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool with the following settings:

Table 992-1

Setting	Requirement
Roadway Standard	IES RP-8-18
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Median Width	22 feet
Number of Lanes in Direction of Travel	3

Table 992-1	
Setting	Requirement
Driver's Side of Roadway	Right
Calculation Area	Bottom
Mounting Height	As per manufacturer's recommendation
Setback	12 feet
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Optimization Criteria	Avg. Illuminance = 1.5 fc Avg./Min. Ratio = 4 Max./Min. Ratio= 10 Lv Max./L Avg. Ratio= 0.3
Arm Length	Pole top fixtures – as provided by the IES file Arm mounted fixtures – 12 feet

SUBARTICLE 992-3.2 is deleted and the following substituted:

992-3.2 Luminaires: The luminaires shall meet the following requirements.

a. A correlated color temperature (CCT) of 3000°K meeting ANSI C78.377A (3045°K, plus or minus 175°K).

b. The optical portion of the housing shall be sealed to provide an IP 66 rating.

The luminaire mounting assembly shall be a slip fitter type designed to accommodate a nominal 2 inch pipe size (2-3/8 inch O.D.) connection. For qualification, the manufacturer must have a fixture with a Type V IESNA light distribution curve (IES LM-79) by an EPA recognized laboratory, capable of providing photometrics similar to a 1000 W HPS fixture when mounted on 80 to 120 foot poles.

SUBARTICLE 992-5.1 is deleted and the following substituted:

992-5 Underdeck Lighting.

992-5.1 Luminaires: The luminaires shall meet the following requirements.

a. For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The optical portion of the housing shall be sealed to provide an IP 55 rating.

Underdeck fixtures shall be wall mounted fixtures.

ARTICLE 992-7 is deleted and the following substituted:

992-7 Luminaire Retrofit Kits for Conventional Lighting.

Luminaire retrofit kits shall meet the following requirements:

a. For APL qualification, the luminaire must have correlated color temperature (CCT) options of 4000°K or less, meeting ANSI C78.377A. For project-specific usage, the light output must have a CCT as specified per the Plans.

b. The luminaire retrofit kit shall be UL 1598C listed by an OSHA "Nationally Recognized Testing Laboratory" (NRTL).

c. The optics shall have an IP 66 rating. Submit testing report.

d. LEDs shall be capable of maintaining 94.1% intensity at 10,000 hours with an ambient temperature of 25°C (IES LM-80). Submit testing report.

e. Luminaire retrofit kits shall have a IESNA light distribution curve (IES LM-79) designated by an EPA-recognized laboratory. Submit testing report.

f. Luminaire retrofit kits shall meet a minimum pole spacing of 240 feet using the AGi32 lighting optimization tool in accordance with the settings shown in Sub-article 992-2.4. Submit IES file.

g. Luminaire retrofit kits shall have a driver rated for 100,000 hours with a power factor greater than or equal to 90% at full load and a total harmonic distortion less than or equal to 20% at full load. Submit driver information that documents these requirements, including the operational temperature of the driver at 25ºC.

h. Luminaire retrofit kits shall accommodate a circuit voltage of 480V.

i. Luminaire retrofit kits shall be provided with a minimum 10kV/10kA internal surge protection device (SPD) meeting UL 1449 and ANSI C62.41.2 Category C High. Submit SPD information that documents these requirements.

j. The manufacturer shall submit a ten-year non-prorated full warranty on all components of the luminaire retrofit kit to the Department. The warranty shall begin on the date the retrofit kit is shipped from the vendor.