SECTION 760 – ROADWAY AND SIGN LIGHTING SYSTEMS
MATERIALS

760.01 Light Poles. Light poles shall be made of aluminum or wood, conforming to requirements of AASHTO publication Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, and this subsection. Drawings for proposed poles shall be submitted in accordance with Subsection 622.03(A) - Equipment List and Drawings.

(A) Aluminum Poles. Aluminum poles shall be spun tapered from seamless aluminum tubing, alloy 6063-T6, conforming to ASTM B 221, with minimum thickness of 0.250 inch. Circumferential or longitudinal welds will be allowed only at lower end of pole where pole is joined to anchor base.

Poles shall have anchor base consisting of permanent mold cast aluminum, alloy 356.0, conforming to ASTM B 108. Anchor bolts shall be stainless steel conforming to Subsection 718.01 - Standard Fasteners, and shall be of quantity and grade indicated in the contract documents. Poles mounted on walls and structures shall have anchor bases and side entry handholes. Poles mounted on bridge structures shall be equipped with vibration damper recommended by pole manufacturer and accepted by the Engineer.

Grounding nut or screw on inner portion of pole shall be placed opposite handhole.

Each pole shall be furnished complete with mast arm, base, ornamental pole top, base cover, and anchor bolts. Unless otherwise indicated in the contract documents, aluminum poles shall have polished natural aluminum finish and stainless steel hardware.

Aluminum poles shall be protected during shipment with protective paper.

(B) Wood poles. Wood poles shall be Southern Yellow Pine or Douglas Fir of length and class number as indicated in the contract documents. Wood poles shall have less than 180 degrees twist in grain over full length, and sweep shall be less than 4 inches. Tops of wood poles shall be beveled.

After fabrication, wood poles shall be pressure treated in accordance with AWPA Use Category System UC4B, Commodity Specification D.
760.02 Luminaire Mast Arms. Mast arms shall be made of seamless aluminum tubing conforming to ASTM B 221, and shall be of type, size, length, and rise, as indicated in the contract documents. Mast arms 8 feet long or shorter shall be tapered elliptical, self-supporting mast arms. Mast arms greater than 8 feet long shall be truss-type mast arms. Ends of mast arms shall be completed in two-inch slipfitter with inner-wired-type pole plates.

760.03 Luminaires for Roadway, Underpass, Sign, and Pedestrian Stairways Lighting.

(A) Luminaires for Roadway Lighting. Luminaires for roadway lighting shall be high-pressure sodium lamps, UL listed for wet locations.

(1) Housing. Housing shall be rear-entry, cast aluminum, with two-inch slipfitter for inner wiring, polished aluminum reflector of snap-in design, and pressed glass refractor optical assembly.

(2) Ballast. Ballast shall conform to the following:

(a) Start and operate high-pressure sodium lamp from 120/240-volt or 240/480-volt, single-phase; or 208/120-volt or 480/277-volt, three-phase, 60-Hz power source.

(b) Protect itself against normal lamp failure modes.

(c) Provide reliable lamp starting and operation in ambient temperatures down to minus 22 degrees F for rated life of lamp. Ballast primary current during starting shall not exceed normal operating current.

(d) Operate continuously at ambient air temperatures from minus 5 degrees F to 77 degrees F, without reduction in ballast life.

(e) Have design life of not less than 100,000 hours.

(f) Operate for at least six months, with lamp circuit in an open or short-circuited condition and without measurable reduction in operating requirements.

(g) Fully comply with requirements of fixture manufacturers and lamp manufacturers. Submit certificate of compliance in accordance with Subsection 106.07 - Certificate of Compliance for ballast to be furnished.

There shall be individual, easily accessible, in-line fuses in each phase leg for each luminaire.
For nominal line voltage and lamp voltage, ballast design center shall vary less than 5 percent from rated lamp wattage.

Lamp wattage regulation spread at lamp voltage shall not exceed 8 percent for ±10 percent line voltage variation at any lamp voltage from nominal through life.

Ballast electrical data and lamp operating volt-watt traces shall be submitted for nominal and ±10 percent rated line voltage to verify ballast performance and compliance with lamp specifications for rated life of lamp.

Lamp current crest factor shall not exceed 1.8 for ±10 percent nominal line voltage variation at any lamp voltage from nominal through life.

Ballast design shall be such that normal manufacturing tolerance for capacitors of ±6 percent will not cause more than a ±5 percent variation in regulation throughout rated lamp life for nominal line voltage.

(3) Lamp. High-pressure sodium lamp shall be clear and shall have mogul base. Lamp wattage shall be as indicated in the contract documents.

(4) Illumination. Luminaires shall provide roadway with minimum average maintained illumination value in accordance with manufacturer’s specifications and IES light distribution type indicated in the contract documents. Photometric data with certification of conformance shall be submitted.

(5) Glare Shield. Internal or external glare shield shall eliminate stray light above 90-degree nadir line for luminaires, as indicated in the contract documents. External shield shall be made of aluminum or zinc-coated steel.

(6) Photoelectric Control Receptacle. Luminaires shall be furnished with or without photoelectric control receptacles, as indicated in the contract documents. When photoelectric control receptacle is included, rain tight shorting cap shall be installed.

(B) Luminaires for Underpass Lighting. Luminaires for underpass lighting shall be high-pressure sodium lamps, UL listed for wet locations.

(1) Housing. Die-cast housing shall enclose ballast, lamp socket, specular aluminum reflector, and refractor of molded, prismatic thermal, shock-resistant glass with polycarbonate vandal shield. Lens assembly shall be fastened by concealed hinges and single-point,
positive-acting latch. Fittings shall be non-ferrous. Unit shall be of size and IES light distribution type indicated in the contract documents.

(2) **Ballast.** Ballast shall be regulator-type, ±10 percent of nominal source voltage, 60 Hz, for multiple circuits and high-pressure sodium lamps. Individual, easily accessible, in-line fuses shall be furnished in each phase leg for each luminaire.

(3) **Lamp.** High-pressure sodium lamp shall be clear and shall have mogul base. Lamp wattage and IES-type light distribution shall be as indicated in the contract documents.

(C) **Luminaires for Sign Lighting.** Luminaires for sign lighting shall be metal halide lamps, UL listed for wet locations.

(1) **Housing.** Aluminum, alzac reflector housing shall have high-impact-resistant glass cover with hinge and latch, and shall be of watertight construction. Bracket raceway shall be furnished with luminaire.

(2) **Ballast.** Metal halide lamp ballast shall be self-regulating at specified nominal voltage ±13 percent, single phase, 60 Hz. Ballast shall be waterproof and mounted integral to the unit. Individual, easily accessible, in-line fuses shall be furnished in each phase leg for each luminaire.

(3) **Lamp.** Lamp shall be metal halide with lamp wattage and IES-type light distribution as indicated in the contract documents.

(D) **Luminaires for Pedestrian Stairways.** Luminaires for pedestrian stairways shall include cast aluminum, recessed box, with wire glass and cast aluminum louver cover, tamper proof screws, and medium porcelain socket. Luminaire dimensions and type shall be as indicated in the contract documents. Luminaires shall be UL listed for wet locations.

760.04 **Cables and Wires for Roadway Lighting System.**

(A) **Cables and Wires.**

(1) **Circuit Cable.** Cable for 120/240 volt or 240/480 volt roadway lighting circuits shall conform to the following requirements: single conductor, 600 volt, AWG sizes as indicated in the contract documents; stranded copper, Type XHHW suitable for use at 167 degrees F, with 2/32-inch-thick rubber insulation, and 3/64-inch-thick neoprene jacket. Rubber insulation and neoprene jacket shall conform to NEC, RHW/USE standards, and ICEA S-105-692 standard.
(2) **Pole Fixture Cable.** Connection of circuit cables from base of light pole or pull box to each luminaire shall conform to the following requirements: single conductor, 600 volt, No. 10 AWG, stranded copper, and Type XHHW or RHW. Unless otherwise indicated in the contract documents, ground conductors shall conform to the following requirements: single conductor, 600 volt, No. 6 AWG, stranded copper, Type XHHW or RHW. Ground conductors shall be installed in conduits.

(3) **Aerial Cable.** Unless otherwise indicated in the contract documents, aerial cable shall conform to the following requirements: No. 1/0 AWG copper, pre-assembled, RINJ-insulation, including copper-clad messenger.

**B) Luminaire and Cable and Wire Identification.** Tags of rigid, non-ferrous material shall be affixed, with machine embossed legend on two sides with non-ferrous wire to feeder, branch feeders, and sub-branch cables and wires in pullboxes and light standard bases. Legend with 1/4-inch-high letters shall indicate feeder designation.

### 760.05 Disconnect and Protective Devices.

(A) **General.** Splices and taps shall be limited to minimum number. Conductor-to-conductor connections shall be made with hydraulically indented lugs.

(B) **Taps.** Taps from feeders to highway lighting luminaires shall be made at lighting standards, with standard connector kits that provide quick-disconnect, fused branch connection to feeder conductors. Waterproof taps shall have dielectric value equal to that of the insulation of conductors joined. Fuses shall be standard midget, ferrule-type, with ampere ratings as indicated in the contract documents.

(C) **Splicing.** Feeders shall be spliced with standard splicing kits of type recommended by cable manufacturer. Splices shall be waterproof and shall have dielectric value equal to that of the insulation of conductors joined.

### 760.06 Waterproof Connectors for Roadway Lighting.** Where indicated in the contract documents, connector kits shall be of waterproof, molded rubber. Connectors shall be 600-volt, quick disconnect, in-line connectors, fused for ungrounded conductor and non-fused for neutral at each pole. Opening in line conductor connectors shall be suitable for cables furnished. Lubrication and taping shall be as recommended by manufacturer of connectors. Fused connectors shall accommodate standard midget, ferrule-type fuses with ampere rating as indicated in the contract documents.
760.07 Photoelectric Control. Photoelectric control unit shall have inrush current rating of 120 amperes. Photoelectric control shall withstand surge current up to 1,000 amperes. Chassis shall withstand hi-pot test of 5,000 volts. Cadmium-sulfide cells shall have 300 to 500 milliwatts maximum dissipation operating voltage range between 105 volts to 285 volts, and mounting features that conform to EEI Publication No. 148, NEMA Publication No. SH18-1959. Photoelectric control unit shall be UL listed for wet locations.

Light level setting shall be adjustable from 0.5 to 3.0 foot-candles with time delay of up to three minutes. Light level setting shall be adjusted for turn on at 0.7 ± 0.2 foot-candles.

END OF SECTION 760