

STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	0	0	0	0

(A) NOTE:

(1) TE Standards are intended to describe the equipment, material, and construction requirements for the Lump Sum Bid Item; ELECTRIC LIGHTING SYSTEM.

(2) PRE-QUALIFICATION. All construction items and materials shall be on the Roadway Lighting Systems and Equipment Prequalified List (PQL 24.2). The PQL is available on the KDOT website: www.ksdot.org, under "Doing Business as" - "Highway Contractors" - "Pre-Qualified Materials". A manufacturer or supplier intending to supply lighting materials under these specifications shall submit an original copy of any catalog cuts, drawings, and/or data sheets for the material(s). A manufacturer or fabricator shall submit shop drawings with supporting calculations meeting AASHTO and KDOT Standards. This information shall be submitted to the Bureau of Traffic Engineering for review and approval.

(B) CONSTRUCTION:

(1) See Standard Specifications, Latest Edition, Sections 814 (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS), & 1703 (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS EQUIPMENT). Locate all existing utilities prior to beginning work. Staking for controllers, poles, and junction boxes shall be done by the contractor, and approved by the engineer in charge.

(C) CONVENTIONAL STEEL LIGHT POLE:

(1) DESIGN. Design shall be in accordance with 2013 AASHTO Specifications for Structural Supports for the Highway Signs, Luminaries and Traffic Signals, including Interims, and KDOT Special Provision 744 (STRUCTURAL METALS FABRICATION). Pole design and shop drawings shall be sealed and signed by a professional engineer registered in the State of Kansas. Shop drawings shall reference the actual pole material to be used in the fabrication of poles for a specific Kansas Department of Transportation project. Shop drawings shall include weld details, referencing approved weld procedures and their given procedure numbers. Weld procedures shall be approved by KDOT prior to use. EPA shall be calculated at 0.86 sq. ft. and weight of 25 lbs.

(2) DESIGN for BRIDGE MOUNTED POLES. Design requirements for bridge mounted light poles shall include Fatigue Importance Category I with Limit State Pressure of 7.2 psf as defined in Section 11.7.2 of the AASHTO Standard Specifications. Assume the base of the light pole is 55 (feet) above finished groundline.

(3) MATERIAL and FABRICATION. Shall comply with the 2013 AASHTO Specifications for Structural Supports for the Highway Signs, Luminaries and Traffic Signals, including Interims, KDOT Special Provision 744 (STRUCTURAL METALS FABRICATION), and Section 1600 (STRUCTURAL STEEL TUBING). The pole shall be one section. The pole base shall have a CJP weld at the base plate, with a backing ring. The base plate shall be made of steel plate meeting the requirements of above or ASTM A-36. Field welds will not be allowed. Pole and foundations details are shown on the ROADWAY LIGHTING DETAIL SHEET TE201a/TE201b.

(a) FRANGIBLE BASE. Shall be cast aluminum and conform to the AASHTO Publication, Standard Specifications for Structural Supports for the Highway Signs, Luminaires, and Traffic Signals. The frangible base shall have high density plastic doors. The color shall be pigmented throughout to give the appearance of aluminum. The doors shall withstand temperature extremes of -70° to 150° F and are compounded with U.V. inhibitors. Contractor shall install per manufacturer's procedures. Fabricator shall provide high strength bolt installation procedure for top and bottom.

(b) LUMINAIRE ARM. Shall be fabricated from 2" (inch) standard pipe meeting the requirements of ASTM A53, ASTM A513, or ASTM A500.

(c) FINISH. The base, luminaire arm, and light pole shall be galvanized according to ASTM A123.

(d) SERIAL NUMBERS. Stencil 2 in. serial numbers in permanent black paint. This shall be legible from the pole's assigned route and 5-6 ft above ground level looking up station.

(D) ELECTRICAL MATERIAL:

(1) PHOTO CELL. Shall be solid state type, 1000 Watts, 1800 VA ballast, single pole, single throw, twist lock mounting. ANSI C136.10, ROHS compliant, UL listed, surge rated in excess of ANSI C136.10 to 20kV/10kA. Shall be made by the same manufacturer as the luminaire, and fail in the on mode.

(2) DISTRIBUTION WIRE. Shall be Type USE-2, stranded, annealed copper meeting the requirements of ASTM B8 and ASTM B33, and be the size specified in the plans.

(3) SECONDARY SERVICE CABLE IN CONDUIT (CIC). Shall be stranded copper single conductor cable for operation at 600 volts maximum. Material shall meet the applicable requirement of ICEA Standard S-105-692 and listed by UL as Type USE-2 for direct burial. Make splices in the secondary service cable inside of tower bases, pole bases, and junction boxes only. Contact the Bureau of Traffic Engineering for approval of other splice locations. The duct shall be polyethylene with minimum tensile strength of 3100 psi, sized to provide the correct fill based on NEC requirements, and shall meet ASTM D-3485 (Latest Revision).

(4) LED LUMINAIRES. Luminaires shall have a housing of aluminum alloy casting, capable of mounting to a 2" (inch) luminaire arm, and in compliance with ANSI C136-37. Shall be IP-66 rated for optical assembly and IP-65 rated for electrical components, and shall have the following: three-hole terminal blocks for incoming #10 AWG AC lines, minimum 20kV/10kA surge protection, a 7-pin photo control receptacle with electronic photocontrol or shorting cap, and an electronic dimmable driver (power supply, rated for 100,000 hours). Shall be fully tested in accordance with IESNA Standard LM-79, pre-wired for installation, and shall maintain 70% of initial lumen output after 100,000 hours of operation. LED luminaire criteria: (lumen output, luminaire wattage, lumens per watt, input voltage, bug rating, CCT (4000k +/- 300k), CRI (70), photometric requirements, and distribution), and the photometric performance criteria: (maintained horizontal illumination, avg/min and max/min uniformity ratios) shall be determined by the project designer. Designers shall conform to the IESNA Standard RP-8-18 and/or AASHTO Standard GL-7-2018 for required illumination, show the BASIS FOR DESIGN (ADDITIONAL CRITERIA) on the TE209, and submit a photometric report to the Bureau of Traffic Engineering for approval.

(5) CONTROLLER. The controller cabinet shall be constructed of 5052 alloy aluminum 0.125" (inch) thick. The cabinet shall be of clean cut design having no sharp edges, corners or projections. The circuiting shall be serviceable by means of a full length hinged door with padlock provisions. The controller shall have 600 volt rated molded case main and secondary breakers, twist-lock photo-cell socket, and electrically held contactors. The equipment within the controller shall be wired prior to delivery. The controller shall have a meter view window and a glass to allow light to the photo-cell that faces NORTH. All conductors coming in to the controller shall be identified with a permanent label.

(a) The main and secondary breakers shall have a mounting dimension of 1 3/8" (inch) wide x 4 1/2" (inch) high mounting holes shall be positioned to accommodate a breaker 2 3/4" (inch) wide side by side. See CONTROLLER DETAIL SHEET TE202.

(b) The contractor shall contact the power company prior to acquiring the lighting controller. An exposed ringless meter design and cover, 200 AMP 5 terminal meter socket with horn bypass, is an approved option for remote access if required by the power company.

(E) GENERAL MATERIALS AND NOTES:

(1) MISCELLANEOUS HARDWARE. Hardware that requires galvanizing or electroplating shall conform to the Standard Kansas Department of Transportation Standard Specifications, Latest Edition, Section 1703.2 (c) (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS EQUIPMENT).

(2) CONDUIT INSTALLATION. Conduit shall be installed per Section 814.3 (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS) of the Standard Specifications and as noted. All electrical conduit above ground shall be metallic. Conduit attached to the bridge shall have expansion fittings installed at the ends of the bridge and at each expansion joint. All attachments to bridges shall have a Highway Right of Way Permit (DOT304), and Utility Attachment Permit (DOT 310) approved before work begins, in accordance with the current Kansas Department of Transportation Utility Accommodation Policy. When pulling wires through conduit, a pulling sock or other similar device shall be used to equalize pulling strain on the conductors.

(3) METALLIC CONDUIT. See Standard Specification 1703.2 (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS EQUIPMENT). Shall be rigid steel conduit meeting the requirements of American Standard Specification C-80.1. Metallic conduit fittings shall be zinc coated and shall meet the requirements of NEMA FB-1.

(4) NON-METALLIC CONDUIT. See Standard Specification 1703.2 (ELECTRIC LIGHTING SYSTEMS AND TRAFFIC SIGNALS EQUIPMENT).

(a) RIGID POLYVINYL CHLORIDE (PVC). Shall meet the requirements of NEMA TC-2, Federal Specifications No. WC 1094A and UL 651. Each length shall bear the Underwriters, Inc. Label. Non-metallic conduit fittings shall be fabricated from polyvinyl chloride meeting the requirements of NEMA TC-3, Federal Specifications No. WC 1094A and UL 514. Each shall bear the Underwriters, Inc. Label. The joints shall be made in accordance with the manufacturers recommendations.

(b) HIGH DENSITY POLYETHYLENE (HDPE). Shall meet the requirements of ASTM F 2160, ASTM F 2176, and NEMA Standard TC-7. Shall be coilable, smooth wall, Schedule 40 or Schedule 80. A letter of certification (LOC) will be required from the conduit producer and/or resin producer. The conduit will need to be marked with ASTM F 2160 designation on the print line. Shall be continuous from outlet to outlet, with no splices allowed. Bend radii shall not exceed the manufacturer's recommendations. Cable fills should not exceed the values set by the NEC.

(5) GROUNDING. Ground all metal parts including poles, controllers, junction boxes, and conduit used above ground with a No. 6 bare wire. Ground wire shall be a #6 AWG Solid bare copper wire and arrangement shall be as noted on plans. Ground rods shall be copper clad 3/4" (inch) diameter by 20' (feet) long, or two ground rods at 10' (feet) each.

(6) ANCHOR BOLTS. Shall conform to the Standard Specification Section 1600 (FERROUS AND NON-FERROUS METALS) (Grade 55) with the following exception: Do not use cut threads, use rolled threads.

(7) BREAK-AWAY CABLE CONNECTORS. The connectors shall provide a fused waterproof wiring connection that when subjected to strain consistent with a knockdown will separate without damage to wiring. When separation occurs, the connectors shall have no contacts exposed to present a shock hazard. The cable connectors shall meet the 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. Connector installation shall be as directed by the manufacturer.

(a) Fuses for inline connectors shall be Class CC and sized in accordance with ampacity conductors in the pole.

(8) JUNCTION BOXES (IN-GROUND). The junction box shall be of sufficient size to facilitate the conduit and wiring as indicated in the plans. Junction boxes shall have the minimum nominal dimensions of 12" (inch) deep with a minimum physical opening of 130 square inches. In-ground junction boxes may be constructed of one of the following methods: Pre-cast concrete with a cast iron cover; Polymer concrete with a polymer concrete cover; fiberglass reinforced polymer body with a polymer concrete ring and cover; High density polyethylene body with polymer concrete ring and cover. The ring shall be securely attached to the body. All conductors coming in to the junction box shall be identified with a permanent label.

(a) Enclosures, boxes and covers are required to conform to all test provisions of ANSI/SCTE 77 2017 "Specification for Underground Integrity" for TIER 15 applications.

(b) The cover shall bear the logo "LIGHTING" clearly and permanently molded or etched into the cover.

(9) JUNCTION BOXES (ABOVE-GROUND). Shall have the nominal dimensions of 12" (inch) by 12" (inch) by 6" (inch). The junction box shall be made of 14 gauge sheet metal (steel) with welded seams, knockouts and weather proof screw cover. Boxes shall be hot dipped galvanized in accordance with ASTM A-123 after fabrication. All conductors coming in to the junction box shall be identified with a permanent label.

(10) WEDGE TYPE STUD BOLT ANCHORS. The contractor shall install two 3/8" (inch) x 3' (inch) wedge type anchors for conduit clamps. The anchors shall be wedge type made from carbon steel meeting AISI 12L14 steel. The minimum embedded depth shall be 1 3/4" (inch).

(11) CONDUIT CLAMPS WITH CLAMP BACKS. The contractor shall install 2" (inch) conduit clamps with a compatible clamp back. Clamps shall be heavy duty steel to secure the 2" (inch) rigid conduit to structure. Conduit clamps are to be spaced at 6' (foot) intervals.

(12) CABLE GRIP SUPPORTS. The contractor shall install one (1) cable support grip in each roadway lighting pole. The cable support grip shall be made of high grade, non-magnetic tin coated bronze strand. The cable support grip shall be capable of securing two (2) #10 AWG type USE-2 cables in a vertical position holding the weight of the cables and cable connectors off the luminaire assembly. See ROADWAY LIGHTING DETAILS SHEET TE201a and TE201b.

03	05-23-23	Added design details/serial numbers/fuse detail			J.A.P.	S.M.P.
02	05-05-21	PQL/Frang. base/AASHTO GL-7-2018/grnd rod/fatigue			J.A.P.	C.P.A.
01	04-28-20	CJP weld/RP-8-18/mast arm requirement			J.A.P.	C.P.A.
NO.	DATE	REVISIONS			BY	APP'D
KANSAS DEPARTMENT OF TRANSPORTATION						
CONSTRUCTION AND MATERIAL						
REQUIREMENTS FOR						
HIGHWAY LIGHTING						
(CONVENTIONAL)						
TE207						
FHWA APPROVAL		07-07-23		APP'D.		Sara M. Peters
DESIGNED	J.A.P.	DETAILED	J.A.P.	QUANTITIES	TRACED	
DESIGN CK.	S.M.P.	DETAIL CK.	S.M.P.	QUAN.CK.	TRACE CK.	