STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
KANSAS	472-85066	2014	152	388

NOTE:

WHENEVER THE PLAN SPECIFICATIONS CONFLICT WITH THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION (KDOT) SPECIFICATIONS, LATEST EDITION, THE PLAN SPECIFICATIONS SHALL GOVERN.

CONSTRUCTION:

SEE STANDARD SPECIFICATIONS, LATEST EDITION, SECTIONS 738 & 814.

TOWERS:

THE TOWERS SHALL BE HIGH STRENGTH STEEL MEETING THE REQUIREMENTS OF ASTM A-595 GRADE A; ASTM A-572 GRADE 50 OR 55; ASTM A1011 HSLAS GRADE 50 OR 55 CLASS 2; ASTM A-1018 HSLAS GRADE 50 OR 55 CLASS 2 AND COMPLY WITH THE KANSAS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, LATEST EDITION. THE TOWERS SHALL BE DESIGNED TO COMPLY WITH THE 2009 EDITION OF THE AASHTO PUBLICATION, STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR THE HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS, AND CURRENT INTERIMS. USE FATIGUE CATEGORY II. THE TOWER SHALL BE GALVANIZED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A-123. THE TOWER SHALL BE ASSEMBLED BY TELESCOPING ON THE JOB SITE.

THE BASE PLATE SHALL BE MADE OF STEEL PLATE MEETING THE REQUIREMENTS OF ABOVE OR ASTM A-36 AND SHALL BE DESIGNED TO WITHSTAND THE FULL BENDING MOMENT OF THE SHAFT.

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. WELD PROCEDURES WILL BE APPROVED BY KDOT PRIOR TO USE. ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 (LATEST REVISION), AND AASHTO STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGN, LUMINARIES AND TRAFFIC SIGNALS AND CURRENT INTERIMS.

NON-DESTRUCTIVE TEST SHALL BE CONDUCTED IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGN, LUMINARIES AND TRAFFIC SIGNALS WITH CURRENT INTERIMS. NON-DESTRUCTIVE TESTING SHALL BE CONDUCTED ON ALL COMPLETE-PENETRATION WELDS. ULTRASONIC TESTING MAY BE CONDUCTED IN LIEU OF RADIOGRAPH TESTING. MAGNETIC PARTICLE TESTING (YOKE METHOD) SHALL BE CONDUCTED ON 25 PERCENT OF ALL PARTIAL-PENETRATION WELDS.

THE MANUFACTURER SHALL PREPARE CERTIFICATIONS COVERING THE COMPOSITE FABRICATED STRUCTURES, INCLUDING CERTIFICATIONS FOR ALL MATERIALS INCORPORATED INTO THE FINAL PRODUCT. THESE CERTIFICATIONS SHALL INCLUDE, BUT IS NOT LIMITED TO, RAW MATERIAL, WELDING ELECTRODES, APPROVED WELDER TEST REPORTS, APPROVED WELD PROCEDURES, AND THE REQUIRED NON-DESTRUCTIVE TEST REPORTS.

ALL TOWERS WILL BE VISUALLY INSPECTED BY A REPRESENTATIVE OF THE KANSAS DEPARTMENT OF TRANSPORTATION FROM THE REGIONAL MATERIALS LAB AND A TEST REPORT COMPLETED PRIOR TO ASSEMBLY.

LOWERING DEVICE:

MAIN SUPPORT ASSEMBLY: THE MAIN SUPPORT ASSEMBLY SHALL BE FABRICATED FROM WELDABLE STRUCTURE STEEL AND SHALL BE ATTACHED TO THE SHAFT BY SLEEVING AND SECURED BY STAINLESS STEEL SET SCREWS OR OTHER SIMILAR ATTACHING MEANS. THE MAIN SUPPORT ASSEMBLY SHALL HAVE SIX (6) HOISTING SHEAVES AND ROLLERS FOR THE POWER CABLE. THE SHEAVES SHALL BE OIL IMPREGNATED, SINTER BRONZE BUSHINGS OVER STAINLESS STEEL SHAFT, OR PERMANENTLY SEALED BALL BEARINGS WITH INNER FIXED RACES. THE MAIN SUPPORT ASSEMBLY SHALL ALSO INCLUDE THREE (3) MECHANICAL LATCHING DEVICES. THE MAIN SUPPORT ASSEMBLY SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A-123, OR ELECTROPLATED WITH A MINIMUM THICKNESS OF 0.4 MIL.

LUMINAIRE RING: THE LUMINAIRE RING SHALL BE CONSTRUCTED OF WELDABLE STRUCTURE STEEL WITH THREE (3), 2" NOMINAL STEEL PIPE MAST ARMS. IT SHALL BE PREWIRED TO DISTRIBUTE POWER TO THE LUMINAIRES FROM THE MAIN POWER CABLE SUPPLY. A TWIST LOCK RECEPTACLE SHALL BE PROVIDED ON THE LUMINAIRE RING TO ALLOW TESTING OF LUMINAIRES WHILE IN THE LOWERED POSITION. THE LUMINAIRE RING SHALL HAVE SPRING LOADED INTERCONNECTED CENTERING ROLLER ARMS OR AN APPROVED DESIGN TO PROVIDE STABILITY AND KEEP THE RING CONCENTRIC AROUND THE POLE DURING RAISING AND LOWERING. THE STEEL USED SHALL COMPLY WITH THE REQUIREMENTS OF ASTM A-36. THE MAST ARM SHALL BE SECURED TO THE LUMINAIRE RING BY AN APPROVED METHOD. THE LUMINAIRE RING SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A-123, OR ELECTROPLATED WITH A MINIMUM THICKNESS OF 0.4 MIL.

HOISTING ASSEMBLY: THE LUMINAIRE RING SHALL BE RAISED AND LOWERED BY THREE (3) SYMMETRICALLY PLACED 7 X 19 - INCH DIAMETER, ZINC ELECTROPLATED STEEL AIRCRAFT CABLES LOCATED INSIDE THE POLE SHAFT, AND ATTACHED TO THE LUMINAIRE RING. THE RAISING AND LOWERING SHALL BE OPERATED BY A WINCH ASSEMBLY WITH A 7 X 19 - INCH DIAMETER ZINC ELECTROPLATED STEEL AIRCRAFT CABLE MEETING THE REQUIREMENTS OF FEDERAL SPECIFICATIONS RR-W-410 AND SHALL BE CAPABLE OF RAISING AND LOWERING A MINIMUM OF SIX (6) LUMINAIRES ON THE RING ASSEMBLY AT AN APPROXIMATE RATE OF 10 FEET PER MINUTE. THE WINCH ASSEMBLY SHALL ACCEPT A PORTABLE POWER UNIT COMPATIBLE TO THE LOWERING DEVICE.

PORTABLE POWER UNIT: THE PORTABLE POWER UNIT SHALL BE ONE-HALF (1/2) HEAVY DUTY, REVERSIBLE DRILL U.L. APPROVED, BEING EQUIPPED WITH A TORQUE LIMITING SAFETY CLUTCH. THE PORTABLE POWER UNIT SHALL BE ARRANGED FOR REMOTE CONTROL OPERATIONS. THE PORTABLE POWER UNIT SHALL BE CAPABLE OF OPERATING THE LOWERING DEVICE.

STEP DOWN TRANSFORMER: STEP DOWN TRANSFORMER SHALL BE 1.5 KVA, SINGLE PHASE WITH A PRIMARY VOLTAGE OF 480 VOLTS AND A SECONDARY VOLTAGE OF 120/240 VOLTS. TRANSFORMER SHALL BE PROVIDED WITH A CARRYING CASE AND THE NECESSARY SERVICE RECEPTACLES.

A FIVE (5) FOOT SECTION OF TOWER CABLE SHALL BE PROVIDED FOR EACH TOWER FOR TESTING LUMINAIRES WHILE THE LUMINAIRE RING IS IN THE LOWERED POSITION. IT SHALL BE EQUIPPED WITH THE APPROPRIATE RECEPTACLES.

TOWER POWER CABLE: TOWER POWER CABLE SHALL BE 600 VOLT. #10 AWG THREE CONDUCTOR, STRANDED, EXTRA-FLEXIBLE COPPER CONDUCTOR TYPE S.O. CORD WITH CHLOROSULFONATED POLYETHYLENE JACKET, OR OTHER APPROVED.

CIRCUIT BREAKER FOR BASE OF TOWER: THE CIRCUIT BREAKER SHALL BE 15 AMP, SINGLE THROW, DOUBLE POLE, WITH 100 AMP FRAME FOR 480 VOLT OPERATION.

SERVICE RECEPTACLE: SERVICE RECEPTACLE SHALL BE WEATHERPROOF, TWIST LOCK, 600 VOLT RATED.

ELECTRICAL MATERIAL:

(A) PHOTO CELL : PHOTO-ELECTRIC CONTROL SHALL BE SOLID STATE TYPE, 1000 W/1800 VA, SINGLE POLE, SINGLE THROW, TWIST LOCK MOUNTING, 105 TO 300 VOLT OPERATION. THE OPERATING LEVELS SHALL BE 1.6 FT. C. ON AND 0.4 FT. C. OFF, WITH AN ALLOWABLE 0.5 FT. C VARIANCE ON OR OFF. THE PHOTO-ELECTRIC CONTROL SHALL HAVE A MINIMUM OF 30 SECOND TIME DELAY AND FAIL IN THE ON MODE.

(B) CONDUCTOR: CONDUCTOR SHALL BE STRANDED ANNEALED COPPER MEETING THE REQUIREMENTS OF ASTM B-8 AND ASTM B-33.

(a) SECONDARY CABLE: SECONDARY CABLE SHALL BE COPPER SINGLE CONDUCTOR CABLE FOR OPERATION AT 600 VOLTS MAXIMUM. MATERIAL SHALL MEET THE APPLICABLE REQUIREMENTS OF ICEA STANDARD S-105-692 AND LISTED BY UL AS TYPE USE-2 FOR DIRECT BURIAL.

(C) DUCT: THE DUCT FOR SECONDARY CABLE UNDERGROUND SHALL BE POLYETHYLENE DUCT WITH MINIMUM TENSILE STRENGTH OF 3100 PSI DUCT SIZED TO PROVIDE FOR 40% MAXIMUM FILL. THE DUCT SIZED SHALL MEET ASTM D3485 (LATEST REVISION).

(D) LUMINAIRES: ALL LUMINAIRES SHALL BE SUPPLIED WITH HIGH POWER FACTOR BALLAST.

1000 WATT TOWER: 1000 WATT TOWER LUMINAIRES SHALL HAVE A HOUSING OF A SINGLE PIECE ALUMINUM ALLOY CASTING WITH AN INTEGRAL SLIPFITTER FOR TWO (2) INCH BRACKET MOUNTING WITH A NINE (9) INCH LIGHT CENTER. THE BALLAST SHALL BE A PEAK LEAD AUTO TRANSFORMER TYPE AT A VOLTAGE OF 480 VOLTS. THE LUMINAIRE MAY OPERATE AS AN OPEN OR CLOSED VENTILATED UNIT. THE REFLECTORS SHALL PROVIDE A SYMMETRIC PATTERN WITH A MAXIMUM CANDLE POWER OF A 60-65 DEGREE VERTICAL BEAM NADIR, OR OTHER APPROVED.

(E) LAMPS: 1000 WATT TOWER LAMPS SHALL BE A MINIMUM OF 110,000 LUMEN, METAL HALIDE.

(F) ENCLOSURE: THE ENCLOSURE CABINET SHALL BE CONSTRUCTED OF 5052 ALLOY ALUMINUM 0.125" 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 ENCLOSURE SHALL HAVE 600 VOLT RATED MOLDED CASE MAIN AND SECONDARY BREAKERS, TWIST-LOCK PHOTO-CELL SOCKET, AND ELECTRICALLY HELD CONTACTORS. THE EQUIPMENT WITHIN THE ENCLOSURE SHALL BE WIRED PRIOR TO DELIVERY. THE ENCLOSURE SHALL HAVE A METER VIEW WINDOW AND A GLASS TO ALLOW LIGHT TO THE PHOTO-CELL.

(a) MAIN AND SECONDARY BREAKERS: THE MAIN AND SECONDARY BREAKERS SHALL HAVE A MOUNTING DIMENSIONS OF 1 " WIDE BY 4 " HIGH MOUNTING HOLES SHALL BE POSITIONED TO ACCOMMODATE A BREAKER 2 " WIDE SIDE BY SIDE. SEE ENCLOSURE DETAIL SHEET.

GENERAL MATERIALS AND NOTES:

(A) MISCELLANEOUS HARDWARE: MISCELLANEOUS HARDWARE THAT REQUIRES GALVANIZING OR ELECTROPLATING SHALL CONFORM TO THE STANDARD KANSAS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST EDITION, SECTION 1703.2 (c).

(B) METALLIC CONDUIT: METALLIC CONDUIT SHALL BE RIGID STEEL CONDUIT MEETING THE REQUIREMENTS OF AMERICAN STANDARD SPECIFICATION C-80.1. TRENCHING FOR CONDUIT WILL NOT BE PERMITTED THROUGH EXISTING PAVEMENT. JACKING WILL NOT BE PERMITTED IN DISTRICT ONE UNLESS APPROVED BY THE ENGINEER IN CHARGE OF CONSTRUCTION.

(C) METALLIC CONDUIT FITTINGS: METALLIC CONDUIT FITTINGS SHALL BE ZINC COATED AND SHALL MEET THE REQUIREMENTS OF AMERICAN STANDARD SPECIFICATION C-80.1.

(D) NON-METALIC CONDUIT:

D.1. RIGID POLYVINYL CHLORIDE (PVC) MEETING THE REQUIREMENTS OF NEMA TC-2, FEDERAL SPECIFICATIONS NO. WC1094A 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. WC1094A AND UL 514. EACH SHALL BEAR THE UNDERWRITERS, INC. LABEL. THE JOINTS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

D.2. HIGH DENSITY POLYETHYLENE (HDPE) MEETING THE REQUIREMENTS OF ASTM F 2160 AND ASTM F 2176. 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.

(E) GROUND: GROUND WIRE SHALL BE A #6 AWG STRANDED BARE COPPER WIRE AND ARRANGEMENT SHALL BE AS NOTED ON PLANS.

(F) ANCHOR BOLTS: ANCHOR BOLTS SHALL CONFORM TO THE STANDARD SPECIFICATION SECTION 1600 (GRADE 55) WITH THE FOLLOWING EXCEPTION. DO NOT USE CUT THREADS. USE ROLLED THREADS.

(G) 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 INCHES 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.

ENCLOSURES, BOXES AND COVERS ARE REQUIRED TO CONFORM TO ALL TEST PROVISIONS OF ANSI/SCTE 77 2002 "SPECIFICATION FOR UNDERGROUND INTEGRITY" FOR TIER 15 APPLICATIONS.

THE COVER SHALL BEAR THE LOGO "LIGHTING" CLEARLY AND PERMANENTLY MOLDED OR ETCHED INTO THE COVER.

JUNCTION BOXES (ABOVE-GROUND): ABOVE GROUND JUNCTION BOXES SHALL HAVE THE NOMINAL DIMENSIONS OF 12 INCHES BY 12 INCHES BY 6 INCHES. 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.

(H) WEDGE TYPE STUD BOLT ANCHORS: THE CONTRACTOR SHALL INSTALL TWO 3/8" X 3" 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"

(I) CONDUIT CLAMPS WITH CLAMP BACKS: THE CONTRACTOR SHALL INSTALL 2" CONDUIT CLAMPS WITH A COMPATIBLE CLAMP BACK. CLAMPS SHALL BE HEAVY DUTY STEEL TO SECURE THE 2" RIGID CONDUIT TO STRUCTURE. CONDUIT CLAMPS ARE TO BE SPACED AT 6' INTERVALS.

(J) ALL WELDS SHALL BE SMOOTH CLEAN DENSE DEPOSIT THAT WILL EXCLUDE MOISTURE AND CONFORM TO A.W.S. SPECIFICATION D1.1 (LATEST REVISION). FIELD WELDS WILL NOT BE ALLOWED.

(K) GROUND RODS: SHALL BE COPPER CLAD 3/4" DIAMETER BY 10' LONG.

NO.	DATE	REVISIONS	BY	APP'D
3	02/27/13	Modified LGT STD & (F), Add (D) D.2, Typos	C.E.	B.D.G.
2	12/28/11	Added inspection paragraph to Towers	C.E.	B.D.G.
1	3/21/11	Changed Anchor Bolts to Grade 55	V.H.	B.D.G.

KANSAS DEPARTMENT OF TRANSPORTATION

CONSTRUCTION AND MATERIAL REQUIREMENTS FOR HIGHWAY LIGHTING (TOWERS)

TE206

FHWA APPROVAL		04/29/2013	APP'D	Brian D. Gower	
DESIGNED	C.E.	DETAILED	C.E.	QUANTITIES	TRACED
DESIGN CK.	B.D.G.	DETAIL CK.	B.D.G.	QUAN. CK.	TRACE CK.

Plotted : 30-DEC-2013 13:34
Drawn By : cp
File : I:\2009\09521\Standards\09521-te206.dgn