FHWA REGION NO.	STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
7	KANSAS	87N-0094-01	1998	153	202

7. **INSTALLATION:** THE CONTRACTOR SHALL VISUALLY VERIFY THAT THE TRAFFIC SIGNAL POLES ARE PLUMB AFTER THE MAST ARM AND OTHER LOADS HAVE BEEN APPLIED. ADJUSTMENT SHALL BE MADE USING THE LEVELING NUTS ON THE ANCHOR BOLTS. THE FINAL DISTANCE BETWEEN THE TOP OF THE FOUNDATION AND THE BOTTOM OF THE LEVELING NUTS SHALL NOT EXCEED 25 mm. PRIOR TO INSTALLING THE POLE THE CONTRACTOR SHALL PROVIDE A SCREEN TO KEEP RODENTS FROM ENTERING THE POLE THROUGH THE GAP AT THE BASE. THE SCREEN MATERIAL SHALL BE A STIFF, WELDED STEEL WIRE MESH WITH 6 mm SQUARE OPENINGS. THE MESH WILL BE APPROVED BY THE ENGINEER ON THE BASIS OF COMPLIANCE WITH THE DIMENSIONAL REQUIREMENTS. THE HEIGHT OF THE SCREEN SHALL BE APPROXIMATELY 300 mm. THE LENGTH OF THE SCREEN SHALL BE APPROXIMATELY EQUAL TO THE INSIDE CIRCUMFERENCE OF THE POLE PLUS 300 mm. PRIOR TO INSTALLING THE TRAFFIC SIGNAL POLE ON THE FOUNDATION, THE CONTRACTOR SHALL ROLL THE SCREEN AND INSERT IT THROUGH THE OPENING AT THE BASE OF THE POLE. AFTER THE POLE HAS BEEN INSTALLED, ALL LOADS HAVE BEEN APPLIED AND THE POLE HAS BEEN PLUMBED THE CONTRACTOR SHALL PUSH THE SCREEN DOWN SO THE BOTTOM EDGE MAKES CONTACT WITH THE FOUNDATION.

B. STEEL TRAFFIC SIGNAL POLES

1. **GENERAL:** STEEL TRAFFIC SIGNAL POLES SHALL CONFORM TO SUBSECTIONS 1605 AND 1606 OF THE LATEST EDITION OF THE STANDARD SPECIFICATIONS AND THE REQUIREMENTS ON THE PLAN. THE POLES AND ARMS SHALL BE TAPERED MONOTUBE MADE ONLY OF ONE LENGTH OF STRUCTURAL STEEL SHEET OF NOT LESS THAN NO. 7 MANUFACTURING STANDARD GAUGE MEETING THE REQUIREMENTS OF THE LATEST EDITION OF THE AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) SPECIFICATION A595 'SPECIFICATION FOR STEEL TUBES, LOW-CARBON, TAPERED FOR STRUCTURAL USE'. AS AN ACCEPTABLE ALTERNATIVE, THE POLES AND ARMS SHALL HAVE A MINIMUM OF 12 SIDES MADE ONLY OF ONE LENGTH OF STRUCTURAL STEEL SHEET OF NOT LESS THAN NO. 7 MANUFACTURING STANDARD GAUGE MEETING THE REQUIREMENTS OF THE LATEST EDITION OF THE ASTM SPECIFICATION A570 'SPECIFICATION FOR STRUCTURAL QUALITY HOT-ROLLED CARBON STEEL SHEET AND STRIP' OR A572 'SPECIFICATION FOR HIGH-STRENGTH LOW-ALLOY COLUMBIUM-VANADIUM STEELS OF STRUCTURAL QUALITY' WITH A MINIMUM YIELD STRENGTH OF 982 kg PER SQUARE mm AND A MAXIMUM SILICONE CONTENT OF 0.06 PERCENT. ONLY ONE LONGITUDINAL WELD, AND NO TRANSVERSE WELDS, SHALL BE PERMITTED IN THE FABRICATION OF THE SHAFT OR ARM. (EXCEPTION: MULTIPLE GAUGE ARMS DESIGNED FOR LENGTHS OF 12 m OR GREATER MAY HAVE BOLTED TELESCOPIC FIELD JOINTS SO AS TO DEVELOP FULL STRENGTH C THE ADJACENT SHAFT SECTIONS TO RESIST BENDING ACTION.)

2. **GALVANIZING:** STEEL TRAFFIC SIGNAL POLES SHALL BE GALVANIZED TO THE REQUIREMENTS OF THE LATEST EDITION OF THE AMERICAN SOCIETY FOR TESTING AND MATERIALS A123 'SPECIFICATION FOR ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS'.

C. ALUMINUM TRAFFIC SIGNAL PEDESTALS

1. **GENERAL:** ALUMINUM TRAFFIC SIGNAL PEDESTALS SHALL CONSIST OF A CAST ALUMINUM BASE. THE SHAFT SHALL BE SPUN FROM ONE PIECE OF SEAMLESS TUBING, MEETING THE REQUIREMENTS OF SUBSECTION 1626.02(b)(2) OF THE LATEST EDITION OF THE STANDARD SPECIFICATIONS HAVING A MINIMUM NOMINAL 3 mm WALL THICKNESS. THE SHAFT SHALL HAVE NO LONGITUDINAL WELDS NOR CIRCUMFERENTIAL WELDS EXCEPT THOSE JOINING THE SHAFT TO THE BASE. ALL PEDESTALS SHALL HAVE A SET SCREW THROUGH THE SHAFT AT THE BASE.

2. **FINISH:** THE SHAFT SHALL HAVE A UNIFORM POLISHED FINISH. EACH SHAFT SHALL BE PROTECTED DURING SHIPMENT AND INSTALLATION.

IX. CONDUIT

A. GENERAL: TRENCHING THROUGH EXISTING PAVEMENT WILL NOT BE PERMITTED UNLESS APPROVED BY THE ENGINEER. CONDUIT UNDER EXISTING PAVEMENT IN DISTRICT ONE SHALL BE INSTALLED USING AN APPROVED BORING METHOD ONLY. CONDUIT RUNS ARE TYPICAL ONLY AND MAY BE ADJUSTED DURING INSTALLATION TO CLEAR OBSTRUCTIONS AND FACILITATE WIRING AS APPROVED BY THE ENGINEER.

B. METALLIC CONDUIT AND FITTINGS

1. **CONDUIT:** METALLIC CONDUIT SHALL BE RIGID STEEL CONDUIT MEETING THE REQUIREMENTS OF THE LATEST EDITION OF THE AMERICAN NATIONAL STANDARDS INSTITUTE SPECIFICATION C80.1 'SPECIFICATIONS FOR ZINC-COATED RIGID STEEL CONDUIT'.

2. **FITTINGS:** METALLIC CONDUIT FITTINGS SHALL BE ZINC COATED AND SHALL MEET THE REQUIREMENTS OF THE LATEST EDITION OF THE AMERICAN NATIONAL STANDARDS INSTITUTE SPECIFICATION C80.4 'SPECIFICATIONS FOR FITTINGS FOR RIGID METAL CONDUIT AND ELECTRICAL METALLIC TUBING'.

3. **BONDING:** ALL METALLIC CONDUITS SHALL BE ELECTRICALLY BONDED BY A GROUNDING BUSHING AND #6 SOLID BARE COPPER WIRE.

C. NON-METALLIC CONDUIT AND FITTINGS

1. **CONDUIT:** NON-METALLIC CONDUIT SHALL BE SCHEDULE 40 RIGID POLYVINYL CHLORIDE MEETING THE REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION STANDARD TC-2 AND SHALL BE LISTED BY THE UNDERWRITERS' LABORATORY, INC.

2. **FITTINGS:** NON-METALLIC CONDUIT FITTINGS SHALL BE FABRICATED FROM POLYVINYL CHLORIDE HAVING THE SAME CHEMICAL AND PHYSICAL PROPERTIES AS THE CONDUIT WITH WHICH IT IS TO BE USED. EACH SHALL BEAR THE UNDERWRITERS' LABORATORY, INC. LABEL. THE JOINTS SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

XI. PULL BOXES

A. GENERAL: SERVICE AND JUNCTION BOX LOCATIONS ARE TYPICAL ONLY AND MAY BE ADJUSTED DURING INSTALLATION TO CLEAR OBSTRUCTIONS AND FACILITATE WIRING AS APPROVED BY THE ENGINEER. THE QUANTITY OF BOXES AS SHOWN IN THE PLANS MAY NOT BE REDUCED. HOWEVER, ADDITIONAL BOXES MAY BE PROVIDED AT THE CONTRACTOR'S EXPENSE. SERVICE AND JUNCTION BOXES SHALL NOT BE LOCATED IN SIDEWALK RAMPS. ALL SERVICE AND JUNCTION BOXES SHALL BE FREE OF TRASH, WIRE SCRAPS, ETC.

B. BEDDING: AN 200 mm LAYER OF AGGREGATE SHALL BE PROVIDED UNDER ALL SERVICE AND JUNCTION BOXES. THE AGGREGATE UNDER SERVICE AND JUNCTION BOXES SHALL MEET THE REQUIREMENTS OF CA-6 DESCRIBED IN SUBSECTION 1102 OF THE STANDARD SPECIFICATIONS. THIS AGGREGATE WILL BE VISUALLY ACCEPTED BY THE ENGINEER.

C. CONDUIT ENTRANCES: THE AREA AROUND THE CONDUIT ENTRANCE SHALL BE FILLED WITH A MORTAR GROUT OR A SILICONE SEALANT.

D. SERVICE BOXES: ALL SERVICE BOXES ARE TO BE EITHER PRECAST CONCRETE WITH A CAST IRON COVER OR FIBERGLASS REINFORCED POLYMER CONCRETE WITH A FIBERGLASS REINFORCED POLYMER CONCRETE COVER. SERVICE BOXES SHALL BE PROVIDED WITH CABLE HOOKS AS DETAILED IN THE PLANS.

E. JUNCTION BOXES: THE CONTRACTOR MAY FURNISH EITHER PRECAST CONCRETE JUNCTION BOXES WITH A CAST IRON COVER OR FIBERGLASS REINFORCED POLYMER CONCRETE JUNCTION BOXES WITH A FIBERGLASS REINFORCED POLYMER CONCRETE COVER.

XII. LUMINAIRES AND LAMPS

A. LUMINAIRES: 400, 250, AND 150 WATT LUMINAIRES SHALL HAVE A HOUSING OF A SINGLE PIECE ALUMINUM ALLOY CASTING WITH AN INTEGRAL SLIP-FITTER FOR 50 mm BRACKET MOUNTING WITH A NATURAL UNPAINTED ALZAK ALUMINUM REFLECTOR. THE BALLASTS SHALL BE REGULATOR TYPE FOR MERCURY VAPOR AT A VOLTAGE OF 120/240 VOLTS AND AUTO-REGULATOR TYPE FOR HIGH PRESSURE SODIUM AT A VOLTAGE OF 120 VOLTS. THE REFRACTORS SHALL BE GLASS OR ACRYLIC WITH TYPE III LIGHT DISTRIBUTION. A PHOTOELECTRIC RECEPTACLE SHALL BE PROVIDED WITH EACH LUMINAIRE.

B. LAMPS

1. **400 WATT LAMPS:** 400 WATT LAMPS SHALL BE 21,000 LUMEN, CLEAR MERCURY VAPOR OR 50,000 LUMEN HIGH PRESSURE SODIUM.

2. **250 WATT LAMPS:** 250 WATT LAMPS SHALL BE EITHER 11,200 LUMEN, CLEAR MERCURY VAPOR OR 30,000 LUMEN, HIGH PRESSURE SODIUM.

3. **150 WATT LAMPS:** 150 WATT LAMPS SHALL BE 16,000 LUMEN HIGH PRESSURE SODIUM 55 VOLT.

C. LIGHTING SECONDARY CABLE: THE LIGHTING DISTRIBUTION CABLE AND POLE AND BRACKET CABLE SHALL BE STRANDED, ANNEALED, TYPE U.S.E.-2 COPPER WIRE.

D. PHOTOELECTRIC CONTROL: PHOTO-ELECTRIC CONTROL SHALL BE SOLID STATE TYPE, 1000 WATT/1800 VA MAX., SINGLE POLE, DOUBLE THROW, TWIST LOCK MOUNTING, 120 VOLT OPERATION. THE OPERATING LEVELS SHALL BE 3 FC ON - 1.8 FC OFF WITH AN ALLOWABLE 25 PERCENT VARIANCE ON OR OFF. THE PHOTO-ELECTRIC CONTROL SHALL HAVE A MINIMUM OF A 30 SECOND TIME DELAY OFF.

XIII. SIGNS

A. GENERAL: THE DESIGN DETAILS (COLOR, LETTER HEIGHT AND LETTER SERIES) FOR ALL REGULATORY AND WARNING SIGNS SHALL BE AS SHOWN IN THE LATEST EDITION OF THE STANDARD HIGHWAY SIGNS MANUAL UNLESS SHOWN OTHERWISE IN THE PLANS. SIGN BLANKS FOR ALL REGULATORY AND WARNING SIGNS SHALL BE 2 mm THICK ALUMINUM ALLOY UNLESS OTHERWISE NOTED IN PLANS. ALL SIGNS SHOWN IN THE BILL OF MATERIALS ON THE TRAFFIC SIGNAL QUANTITIES SHEET SHALL BE INCLUDED IN THE LUMP SUM COST FOR THE BID ITEM OF 'TRAFFIC SIGNAL INSTALLATION'.

B. OVERHEAD STREET NAME SIGNS

1. **CONSTRUCTION:** OVERHEAD STREET NAME SIGNS SHALL BE TYPE 5052-H38 ALUMINUM ALLOY 3 mm THICK. THE SIGN FACES SHALL BE DIRECT-APPLIED WHITE ENCLOSED LENS HIGH PERFORMANCE REFLECTIVE LEGEND AND BORDERS ON A GREEN ENCLOSED LENS HIGH PERFORMANCE REFLECTIVE SHEETING BACKGROUND. THE GREEN SHEETING SHALL CONFORM TO FEDERAL COLOR STANDARD 595A, COLOR NO. 14109. UNLESS OTHERWISE SPECIFIED IN THE PLANS, COPY SIZE FOR THE LEGENDS SHALL BE AS FOLLOWS: SERIES 'E' MODIFIED - 150 mm UPPER CASE FOR SW, ST, AV; SERIES 'E' MODIFIED - 200 mm UPPER CASE W/150 mm LOWER CASE FOR NAMES; SERIES 'E' MODIFIED - 200 mm FOR NUMERALS. THE LEGEND SHALL BE CENTERED ON THE SIGN FACE. THE BORDER SIZE SHALL BE 20 mm WIDE. ALL CORNERS ON SIGN BLANKS SHALL BE ROUNDED.

2. **INSTALLATION:** STREET NAME SIGNS SHALL BE INSTALLED ON MAST ARMS, BETWEEN THE SIGNAL POLE AND THE FIRST TRAFFIC SIGNAL HEAD ASSEMBLY. THE FINAL LOCATION TO BE DETERMINED BY THE ENGINEER.

C. LAYOUT: BEFORE FINAL FABRICATION AND SHIPMENT, THE MANUFACTURER OR SUPPLIER SHALL PROVIDE THE ENGINEER WITH A LAYOUT OF EACH SIGN SHOWING THE EXACT STREET NAME LETTERING TO BE PLACED ON THE SIGN.

D. MOUNTING:

1. **REGULATORY SIGNS:** THE R10 SERIES SIGNS SHALL BE MOUNTED ON THE MAST ARM TO THE RIGHT OF THE LEFT TURN SIGNAL HEAD USING AN APPROVED MOUNTING BRACKET AS SHOWN IN THE TRAFFIC SIGNAL INSTALLATION DETAILS. THE MOUNTING BRACKET SHALL BE CAPABLE OF WITHSTANDING A WIND LOAD IN EXCESS OF 160 km/h.

2. **OVERHEAD STREET NAME SIGNS:** THE OVERHEAD STREET NAME SIGNS SHALL BE MOUNTED ON THE SIGNAL MAST ARM, BETWEEN THE SIGNAL POLE AND THE FIRST TRAFFIC SIGNAL HEAD ASSEMBLY. THE FINAL LOCATION WILL BE DETERMINED BY THE ENGINEER. INSTALLATION OF SIGNS ON MAST ARMS SHALL BE ACCOMPLISHED WITH SUITABLE STAINLESS STEEL BANDING, CLAMPS, AND BRACKETS CAPABLE OF WITHSTANDING 160 km/h WINDS. STREET NAME SIGNS OVER 450 mm IN HEIGHT SHALL BE INSTALLED USING APPROVED SIGN MOUNTING BRACKETS. ALL BOLTS INSERTED THROUGH SIGN FACES SHALL HAVE FLAT WASHERS INSTALLED BETWEEN THE REFLECTIVE SHEETING AND BOLT HEADS. BOLT HOLES IN SIGNS SHALL BE DRILLED IN THE FIELD. SIGNS SHALL BE MOUNTED SUCH THAT THE LEGEND IS LEVEL.

3. **PEDESTRIAN PUSHBUTTON SIGNS:** SIGNS SHALL BE MOUNTED TO THE TRAFFIC SIGNAL POLE ABOVE THE APPROPRIATE PEDESTRIAN PUSHBUTTON. MOUNTING SHALL BE ACCOMPLISHED USING SUITABLE STAINLESS STEEL BANDING, CLAMPS AND BRACKETS CAPABLE OF WITHSTANDING 160 km/h WINDS.

E. ACCEPTANCE: ALL SIGNS WILL BE ACCEPTED ON THE BASIS OF CATALOG CUTS AND VISUAL INSPECTION BY THE ENGINEER WHEN DELIVERED TO THE PROJECT SITE.

XIV. PEDESTRIAN PUSH BUTTON

A. GENERAL: THE PEDESTRIAN PUSH BUTTON HOUSING SHALL BE CONSTRUCTED FROM HIGH DENSITY ALUMINUM. IT SHALL CONTAIN A SILICON OR NEOPRENE COVER TO BODY GASKET. COVER SCREWS SHALL BE STAINLESS STEEL. THE SWITCH AND ACTUATOR SHALL BE PROTECTED FROM DUST AND MOISTURE WITH A SILICON OR NEOPRENE COVER.

NO.	DATE	REVISIONS	BY	APP'D
3				
2				
1				

KANSAS DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL SPECIFICATIONS

153/202

TE120ESI 04/05/95

FHWA APPROVAL			06/08/95	APP'D	James E. Tobaben		
DESIGNED	G.J.M.	DETAILED	G.J.M.	QUANTITIES		TRACED	
DESIGN CK.	L.G.V.	DETAIL CK.	L.G.V.	QUAN. CK.		TRACE CK.	

Plotted By : FISCHER
Plot File : e:\trafstdm\tei20esi.dgn
Plot Date : 00000STIME00000