FHWA REGION NO.	STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
7	KANSAS	87N 0064-01	1997	89	130

The following legends shall be used:

(a) Traffic signal and pedestrian signal cables

NW Sigs. = Traffic signal cable to NW corner
NW Peds. = Pedestrian signal cable to NW corner

NE Sigs. = Traffic signal cable to NE corner
NE Peds. = Pedestrian signal cable to NE corner

SW Sigs. = Traffic signal cable to SW corner
SW Peds. = Pedestrian signal cable to SW corner

SE Sigs. = Traffic signal cable to SE corner
SE Peds. = Pedestrian signal cable to SE corner

(b) Detector Feeders

*WBLT = Phase 1 Westbound Left Turn Loop
EB FAR = Phase 2 Eastbound Far Advance Loop
EB MID = Phase 2 Eastbound Middle Advance Loop
EB CLOSE = Phase 2 Eastbound Close Loop
EB RT. LN. = Phase 2 Eastbound Right Lane Loop (If Applicable)
EB LT. LN. = Phase 2 Eastbound Left Lane Loop (If Applicable)
SBLT = Phase 3 Southbound Left Turn Loop
NB FAR = Phase 4 Northbound Far Advance Loop
NB MID = Phase 4 Northbound Middle Advance Loop
NB CLOSE = Phase 4 Northbound Close Loop
NB RT. LN. = Phase 4 Northbound Right Lane Loop (If Applicable)
NB LT. LN. = Phase 4 Nothbound Left Lane Loop (If Applicable)
EBLT = Phase 5 Eastbound Left Turn
WB FAR = Phase 6 Westbound Far Advance Loop
WB MID = Phase 6 Westbound Middle Advance Loop
WB CLOSE = Phase 6 Westbound Close Loop
WB RT. LN. = Phase 6 Westbound Right Lane Loop (If Applicable)
WB LT. LN. = Phase 6 Westbound Left Lane Loop (If Applicable)
NBLT = Phase 7 Northbound Left Turn Loop
SB FAR = Phase 8 Southbound Far Advance Loop
SB MID = Phase 8 Southbound Middle Advance Loop
SB CLOSE = Phase 8 Southbound Close Loop
SB RT. LN. = Phase 8 Southbound Right Lane Loop (If Applicable)
SB LT. LN. = Phase 8 Southbound Left Lane Loop (If Applicable)

12. The traffic signal and pedestrian signal field wires shall terminate at the following locations in all 332 cabinets:

WBLT - RED 125, YELLOW 126, GREEN 127
EB SIGS. - RED 128, YELLOW 129, GREEN 130
EB PEDS. - DW 113, WALK 115
SBLT - RED 116, YELLOW 117, GREEN 118
NB SIGS. - RED 101, YELLOW 102, GREEN 103
NB PEDS. - DW 104, WALK 106
EBLT - RED 131, YELLOW 132, GREEN 133
WB SIGS. - RED 134, YELLOW 135, GREEN 136
WB PEDS. - DW 119, WALK 121
NBLT - RED 122, YELLOW 123, GREEN 124
SB SIGS. - RED 107, YELLOW 108, GREEN 109
SB PEDS. - DW 110, WALK 112

13. The detector feeders and the pedestrian pushbutton field wires shall terminate at the following locations in all 332 cabinets:

a. Detector Feeders

WBLT - I-1-DE
EB FAR ADV - I-2-DE
EB MID ADV - I-2-JK
EB CLOSE - I-3-DE
SBLT - I-5-DE
NB FAR - I-6-DE
NB MID - I-6-JK
NB CLOSE - I-7-DE
EBLT - J-1-DE
WB FAR - J-2-DE
WB MID - J-2-JK
WB CLOSE - J-3-DE
NBLT - J-5-DE
SB FAR - J-6-DE
SB MID - J-6-JK
SB CLOSE - J-7-DE

All drain wires to terminate at terminal L of the corresponding slot.

b. Pedestrian Pushbuttons

EB PEDS. - I-12-D
NB PEDS. - I-12-J
WB PEDS. - I-13-D
SB PEDS. - I-13-J

14. If any additional loop or field wire terminations are necessary, their location will be determined by the Engineer or his representative.

06. MAST ARM AND POLE BASE CABLE IDENTIFICATION

The following is the specification for identifying all cables used in the complete operation of the traffic signals which are located in mast arms and pole bases.

The through traffic and pedestrian signal cables shall be legibly identified with the use of Nylon Identification Cable Ties. The marking pad size shall be 1/2 inch x 7/8 inches (i.e., TY-RAP #TY546M). The legend shall be made with a permanent type marking pen.

The pushbutton cables shall be legibly identified with the use of Nylon Identification Cable Ties. The marking pad size shall be 1 inch x 5/16 inches (i.e., TY-RAP #TY551M). The legends shall be made with a permanent type marking pen.

A. Mast Arm Traffic and Pedestrian Signal Cable Legends

1. Mast Arm Signal Cables

Lt. Turn Sig. - Left Turn Signal
Out Bd. Sig. - Farthest Through Traffic Signal from Pole
Center Sig. - Next Farthest Through Traffic Signal from Pole (If Applicable)
In Bd. Sig. - Closest Thru Traffic Signal to Pole
SOP Sig. - Side of Pole Through Traffic Signal

2. Pole Mounted Pedestrian Signals and Pushbuttons

Ped. Sig. - Pedestrian Signal
Ph.2 P.B. - All Phase 2 Pushbuttons
Ph.4 P.B. - All Phase 4 Pushbuttons
Ph.6 P.B. - All Phase 6 Pushbuttons
Ph.8 P.B. - All Phase 8 Pushbuttons

07. TRAFFIC SIGNAL HEADS

Traffic signal heads mounted on the side of poles or on pedestals shall be ten feet (10') from the ground to the bottom of the signal head.

Type II side-of-pole pedestrian signal bracket to be mounted on back side of pole 135° clockwise from mast arm.

Traffic signal heads mounted on mast arms or span wire shall be no less than sixteen feet (16') and no more than nineteen feet (19') from the pavement to the bottom of the signal head. In some instances the Engineer may require the signal to be mounted above sixteen feet (16') for better visibility. Under no circumstances shall the bottom of the signal be more than nineteen feet (19') above the pavement.

The Engineer shall direct the final positioning of the signal heads. Signal heads shall not be installed at any intersection until all other signal equipment, including the controller, is in place and ready for operation at that intersection, except that the signal heads may be mounted if the faces are not directed toward traffic or if the faces are covered.

08. POLE INSTALLATION

When installed, the traffic signal poles shall be back raked according to the manufacturer's recommendation to allow for deflection, such that the pole will be plumb when loaded.

09. LOOP DETECTOR INSTALLATION

The field loop conductor installed in the pavement shall run continuously from the terminating service box, junction box, or base with no splices permitted. **The field loop conductors shall be spliced to the lead-in cable and the lead-in cable shall run continuously from the terminating service box, junction box, or base to the sensing unit, except on multiple loop installations where additional loop conductors may be spliced to the lead-in cable as directed by the Engineer.**

All lengths of loop wires that are not embedded in the pavement shall be twisted with at least two (2) turns per foot, including lengths in conduits and handholes.

The electrical splice between the loop lead-in cable to the controller and the loop wire shall be made by the following method:

1. Remove all lead-in cable coverings and ground wire, leaving four (4) inches of insulated wire exposed.

2. Remove the insulation from each conductor of the lead-in cable and scrape both copper conductors with knife until bright.

3. Remove appropriate length of insulation from the ends of the loop wires and scrape both copper conductors with knife until bright.

4. Conductors shall be joined by using a #14 butt splice. The two splices shall be staggered to provide adequate insulation. Each splice shall be insulated with layers of thermoplastic or neoprene insulation electrical tape bearing the label of the Underwriters Laboratories, Inc., applied to a thickness equal to and well looped over the original insulation.

The two splices shall then be over-wrapped with layers of thermoplastic or neoprene insulation as above and then coated thoroughly with a water proof electrical coating.

The location of each loop shall be marked on the pavement with crayon or spray paint. The contractor shall obtain the approval of the Engineer prior to cutting the saw slots.

The saw shall be equipped with a depth gauge and horizontal guide to assure proper depth and alignment of the slot. The blade used for the saw cut shall provide a clean, straight, well-defined one-fourth (1/4) inch wide saw cut without damage to adjacent areas. The depth of the saw cut shall be 3 1/2 inches deep. Where the loop changes direction, the saw cuts shall be overlapped to provide full depth at all corners. Right angle or corners less than 90° shall not be used.

Before installing the loop wire, the saw cuts shall be checked for the presence of jagged edges or protrusions. Should these exist, they must be removed. The slots must be cleaned and dried to remove cutting dust, grit, oil, moisture or other contaminants. Cleaning shall be achieved by flushing clean with a stream of water, and following this, the slots should be cleared of water and dried using oil-free compressed air.

Loop detector conductor shall be installed using a one-eighth (1/8) inch to three-sixteenth (3/16) inch thick wood paddle.

Each loop shall be coiled clockwise (or per manufacturer's recommended practice) and the beginning conductor banded in the terminating handhole or base with a symbol "S" to denote start of conductor. Each loop shall be further identified by phase or function as shown on the project plans, with durable tags, or as directed by the Engineer.

3M Micro-Loops will be accepted in lieu of wire wound loops (excluding presence type loops) for close loops (2 required per lane), center and far advance loops (1 required per lane). Placement in lanes shall be according to manufacturer's recommendation. Microloop lead-in (home run) cables to be 3-M type CC30003, twisted, shielded, waterblock cable.

Each loop spliced to lead-in cable, checked at control cabinet, shall not measure less than 100 megohms to ground.

Contractor to supply City of Wichita with a typed record of loop inductance and resistance to ground of each loop measured at cabinet. Provide the date each loop was checked.

Recommended Microloop Installation Guidelines:

a. Before installing the microloop probe, a magnetic field strength and a magnetic field noise measurement shall be taken at the location of installation shown on the project plans. The readings must fall within the prescribed limits set by the manufacturer or their representative. If measurements as determined by engineer exceed specified limits, appropriate measures shall be taken to bring them within operational limits per manufacturer's specifications. If manufacturer's specified limits cannot be met, a standard inductance loop, as determined by engineer, shall be installed in lieu of microloop.

b. Make a sawcut from the curb to the furthest most probe location and remove any water from cut. Bore a 1 1/2" hole 18" below the 1/4" by 3 1/2" deep sawcut at determined probe location(s) for insertion of a 1" PVC conduit. The conduit shall be cut to an 18" length and bottom cap installed (1" plastic "push penny" plug, i.e., T&B #1472).

c. If when installing two or more probes in a set, and there is excess cable between probes, a hole of sufficient depth shall be bored between the probes and the excess cable be inserted into the hole. Fine dry sand, such as sandblasting sand, or other material approved by the engineer should be used to fill the holes and conduit to the bottom of the saw cut. Any excess area around the conduit should also be filled.

d. Before beginning permanent installation, resistance checks shall be made with an ohmmeter. Readings shall be in accordance with manufacturer's expected readings. Also a reading shall be taken with a megohmmeter to insure that resistance to ground is greater than 100 megohms. These checks shall be made before the permanent splice is made and taken at the cabinet before termination. An approved sealant shall then be used to fill the sawcut.

10. MESSENGER CABLE

Where shown in the plans, the messenger cable shall be used to support all overhead communications and detector lead-in cable. The messenger cable shall be 5/16 inches in diameter and shall include devices such as rings or spiral slashing used to attach the cable, and shall run from struture to structure without splicing. Prior to erecting messenger cable, the contractor shall determine the length of the strand required to span the distance between the poles indicated on the drawings, allowing a sufficient additional length of span wire to compensate for sag.

No messenger cables shall be erected which would lie on, or are liable to run on, a utility company wire or cable, tree limb, etc. If a messenger cable is erected within 12 inches of any other cable, wire or structure, it shall be protected with plastic wire guards. The height of the messenger cable on the pole shall conform to requirements of the serving utility and the National Electrical Code, and the National Electric Safety Code.

NO.	DATE	REVISIONS	BY	APP'D
3				
2				
1				

KANSAS DEPARTMENT OF TRANSPORTATION

ADDITIONS TO TRAFFIC SIGNAL SPECIFICATIONS

B

SHEET NO. OF	SCALE	APP'D	
DESIGNED	DETAILED	QUANTITIES	TRACED
DESIGN CH.	DETAIL CH.	QUAN. CH.	TRACE CH.

ORIGINAL