FHWA REGION NO.	STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
7	KANSAS	87N 0064-01	1997	88	130

CITY OF WICHITA, KANSAS
SPECIFICATIONS

TRAFFIC SIGNAL INSTALLATION

01. GENERAL

The contractor shall have a licensed journeyman electrician on site while traffic installation work is performed.

The contractor shall notify the appropriate power company prior to any service connection or attachment to determine the proper type and method of hook-up or installation. The cost of any initial hook-up charge shall be borne by the contractor. This shall include, but not be limited to, the cost of power supplied for all testing until the signal installation is accepted.

02. CONDUIT

All conductors shall be run between bases, junction boxes pull boxes, and services boxes in rigid conduit conforming to the provisions of Section 2 of these specifications. The size of the conduit used shall be of the size as shown on the plans.

The ends of all conduit shall be well reamed to removes burrs and rough edges. Field cuts shall be made square and true so that the ends will butt or come together for the full diameter thereof. Slip joints or running threads will not be permitted for coupling conduit. When a standard coupling cannot be used, an approved threaded union shall be used. The threads on all conduit shall be painted with a good quality of lead or rust preventative paint before couplings are made. All couplings shall be fitted and tightened until the end of the conduits are brought together. Where coating on conduit has been injured in handling, or installing, such injured places shall be thoroughly painted with rust preventative paint.

All conduit ends shall be threaded and capped with standard pipe caps until wiring is started. When caps are removed, the threaded ends shall be provided with approved conduit bushings.

Conduit bends, except factory bends, shall have a radius of not less than six (6) times the inside diameter of the conduit. Where factory bends are not used, conduit bends shall be made without crimping or flattening, using the longest radius practicable.

Conduit set in bases shall extend two to three inches (2" to 3") vertically from the top of the base. A plastic or metal conduit bushing shall be installed on the end of all conduit terminating within a base. Conduit shall enter through the sides of a pull box and shall leave the major portion of the box clear. Conduit entering concrete service and junction boxes shall not extend more than 5" inside of service or junction box as measured along the longitudinal axis of the conduit. **Conduit entering service boxes shall be at least six inches (6") above the crushed rock bottom of the service hole. Conduit should be sloped to drain as directed by the Engineer. At all outlets, conduits shall enter from the direction of the run.**

Wherever possible, the conduit shall be installed by trenching. Trenches shall run in straight lines between pull boxes and bases. The location of the conduit shall be as shown on the plans, except that where physical obstructions dictate, the location shall be determined by the Engineer. Conduit shall be installed to a depth of at least thirty inches (30") below finish grade. This requirement may be waived by the Engineer where physical conditions or obstructions warrant.

Trenches shall be backfilled with material free of rock and compacted in lifts by hand tamping or with mechanical tampers to the density noted on the plans. If a density is not specified on the plans, trench backfill shall be compacted until, in the opinion of the Engineer, no significant future settlement will occur.

Existing underground conduit to be incorporated into a new system shall be cleaned with a mandrel and blown out with compressor air.

Conduit runs shown on the plans are for bidding purposes only, and may be changed with permission of the Engineer to avoid underground obstructions.

Conduit placed under existing pavement or sidewalk shall be installed by an approved jacking or drilling method. The existing pavement shall not be disturbed unless otherwise noted on the plans or approved by the Engineer. Excessive use of water such that the pavement might be undermined, or the subgrade softened, will not be permitted.

03. CONCRETE BASE FOR POLES AND CONTROLLER CABINET

Bases for poles and cabinets shall be reinforced concrete as detailed on the plans. The reinforcing bars shall be free of rust and dirt and shall be of the size, number and dimensions shown on the plans.

Anchor bolts shall extend uniformly above the finish grade of the concrete base a height equal to the manufacturer's recommendations (leaving at least three threads exposed when secured).

The anchor bolt sizes for the pole bases are to be standardized as follows:

1. Mast arm lengths 16' through 38'
   4 - 1.50" Dia. x 54" long x 6" hook
   Bolt Circle = 16"

2. Mast arm lengths 39' through 55'
   4 - 1.75" Dia. x 84" long x 6" hook
   Bolt Circle = 20"

The contractor shall design an anchor bolt assembly which shall be welded to the rebar cage and the resulting unit inserted in the form for the concrete base. The unit shall be designed and constructed such that, after insertion in the form, it can be checked for proper orientation, elevation and verticality. "Stabbing" of anchor bolts or ground rods will not be permitted.

The location of the bases shall be as shown on the plans. Any variation from the plan location shall be only with the approval of the Engineer.

Steel traffic signal pole bases shall be constructed in two pours. The initial concrete placement shall end six inches (6") below finish grade. A six inch (6") thick, thirty-six inch (36") square concrete cap shall be poured when the pole has been erected, plumbed, and approved by the Engineer. The top of the base shall be slightly (1/4" to 1/2") higher than the adjacent curb and gutter, or finish grade if no curb and gutter. Aluminum pedestal bases shall be constructed in one pour as detailed on the plans.

04. WIRING

Wiring shall conform to the appropriate articles of the National Electric Code or subsequent revisions. The conductors from the terminal block in the controller to the signal base shall be a continuous run. No splices of cable will be permitted in conduit or outside of junction boxes, service boxes or pole bases unless otherwise specified in the supplemental specifications, special provisions, or on the plans for an overhead wiring system. All signal cable splices shall be made above ground in pole or pedestal bases.

When conductors and cables are pulled into the conduit, all ends shall be taped to exclude moisture, and shall be so kept until the splices are made or terminal appliances attached. Ends of spare conductors shall remain taped.

When pulling conductors through conduits, a powdered soapstone, talc or other approved lubricant shall be used. Cable shall not be taped or bundled together to be to be pulled or left in conduit.

Six feet (6') of slack or excess cable, as applicable, shall be left in each service box for traffic signal cable, and detector lead-in wire.

Two feet (2') of slack or excess cable shall be left in each junction box and at each termination point.

Excess cable to be uniformly bundled and secured with 1/4-20 threaded stud, as close as possible to top of service boxes and junction boxes.

A. Splices

1. Signal conductor cable - Conductors shall be joined by twisting the conductors. Conductor insulation shall be penciled, trimmed to conical shape, before applying splice insulation. Splice insulation shall consist of layers of thermoplastic or neoprene insulation electrical tape bearing the label of the Underwriters Laboratories, Inc., applied to a thickness equal to and well lapped over the original insulation, except that on high voltage splices two layers of rubber tape conforming to the requirements at A.S.T.M. designation: D 119 shall be applied over the conductor before placing the thermoplastic tape. The splice shall then be well covered with two layers of friction or other approved tape. At least two feet (2') of slack shall be left for each cable splice in pedestal and pole bases.

2. When terminating ends of cable at all terminal blocks an approved #14 insulated spade terminal shall be properly crimped on end of each conductor to provide a secure connection.

3. Locking spade terminals shall not be used.

B. Wiring Notes

1. **The Contractor shall furnish and install all loop wire, shielded loop lead-in wire, power supply cable and traffic signal cable for the complete operation of the traffic signal.**

2. One seven conductor cable shall be run from the controller to each signal pole for pedestrian movement. The following color codes shall be used:

Red	Don't Walk (Phase 2 or 6)
Green	Walk (Phase 2 or 6)
Orange	Push Button (Phase 2 or 6)
White w/Black	Don't Walk (Phase 4 or 8)
Blue	Walk (Phase 4 or 8)
Black	Push Button (Phase 4 or 8)
White	Common

3. One five conductor cable shall be run from the pole base to each 3-section signal head. The following color codes shall be used:

Black	Not Used
White	Common
Red	Red Ball
Green	Green Ball
Orange	Yellow Ball

4. One seven conductor cable per conflicting movement shall be run from the controller to each signal pole. The following color codes shall be used:

White	Common
Red	Red Ball
Green	Green Ball
Orange	Yellow Ball
Blue	Green Arrow
Black	Yellow Arrow
White w/Black	Street Name Sign (where applicable)

5. Each signal head mounted on a signal pole or mast arm shall have one continuous multi-conductor cable run from the pole base to the signal head. A five-section signal head (left turn signal) shall have a seven conductor cable. A three-section signal head (through movement) shall have a five conductor cable; Pedestrian signal heads shall have a five conductor cable; Each push-button shall have a two conductor cable.

6. A single conductor stranded No. 8 green wire shall carry the equipment ground from the grounding lug of all signal poles to the controller cabinet and the power disconnect box.

7. One five conductor cable shall be run from the pole base to pedestrian signal head. The following color codes shall be used:

White	Common (All Phases)
Red	Don't Walk (Phase 2 or 6)
Green	Walk (Phase 2 or 6)
Orange	Don't Walk (Phase 4 or 8)
Black	Walk (Phase 4 or 8)

8. Identify cable runs in cabinet.

05. 332 CABINET WIRING AND CABLE IDENTIFICATION

The following is the standard City of Wichita specifications for wiring and labeling cables in a 332 cabinet and shall be closely followed, any deviation from these specifications must be approved by the Engineer or his representative:

A. Cabinet Wiring

1. All cables shall have adequate excess cable at the termintion ends so there is no tension on the conductors.

   (a) Traffic signal cables shall be five (5) feet in length and stripped back three (3) feet.

   (b) Pedestrian signal cables shall be the same as the signal cables except the push button conductors shall be seven (7) feet in length to reach the proper termination point without the use of a butt splice.

   (c) Detector feeder cable shall be eight (8) feet in length and stripped back eight (8) inches.

2. The cables shall be formed in such a manner so that any access panels can be lowered without interference.

3. There shall not be any use of tape on the stripped out conductors.

4. Nylon-cable ties shall not be used on any field cables except those used for identification.

5. The drain wire of each detector feeder shall be covered with a tube type covering (i.e., shrink tube) not more than three (3) times the diameter of the wire.

6. All cable fillers shall be removed from stripped back cable.

7. Each conductor shall be separately terminated with a non-locking, insulated block fork terminal of the appropriate size.

8. All conduits entering the cabinet base shall be closed with an approved duct seal.

9. All excess cable shall be neatly formed in the bottom of the cabinet.

10. All cables terminating at the input files shall be run in the provided pan ducts.

11. All traffic and pedestrian signal cables, also detector feeders, shall be permanently and legibly identified by the use of Nylon Identification Cable Ties. Traffic signal and pedestrian signal cables shall have a marking pad size of 1/2 inch x 7/8 inches (i.e., TY-RAP #TY546M). Detector feeders shall have a marking pad size of 1 inch x 5/16 inches (i.e., TYP-RAP #TY551M). The legends shall be made with a permanent type marking pen.

NO.	DATE	REVISIONS	BY	APP'D
3.				
2.				
1.				

KANSAS DEPARTMENT OF TRANSPORTATION

ADDITIONS TO TRAFFIC SIGNAL SPECIFICATIONS

A

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