

Plotted By : @@USERNAME@@ Thacher Bldg., 4th Floor
Plot File : @@@@@@@@@@@@@@GNSPEC@@@@@@@@@@@@@
Plot Date : @@@@@@SYTIME@@@@@

3.2.21.3. LETTERING. Copy size for the legends shall be as follows:
150 mm series E–Modified upper case for SW, ST, AV; 200 mm
upper case with 150 mm lower case series E–Modified for names;
200 mm series E–Modified for numerals.

3.2.21.4. ACCEPTANCE. Before final fabrication and shipment, the
manufacturer or supplier shall provide, for the Engineer's approval,
a layout of each sign showing the exact street name lettering to be
placed on the sign. The signs shall be visually accepted by the
Engineer.

3.2.22.REGULATORY SIGNS. The design details (color, letter height and
letter series) for all regulatory signs shall be as shown in the latest
edition of the Standard Highway Signs Manual. Special signs not covered
by the Standard Highway Signs Manual shall be as shown in the Plans.
Sign blanks shall be a minimum of 2 mm thick aluminum alloy. The
sign face shall be of high–performance retroreflective sheeting meeting
the requirements of Subsection 2201 of the Standard Specifications.

3.2.22.1. ACCEPTANCE. Regulatory signs included in the Traffic
Signal Installation bid item will be accepted in accordance with
Section 3.3. of these specifications, with additional certification
certification stating that the retroreflective sheeting used to
manufacture the signs was pre–qualified under Subsection 2201 of
the Standard Specifications.

3.2.23. BLANK OUT SIGNS. The blank out sign legend shall be as
indicated in the Plans. When energized, the sign message shall be
clearly legible under any lighting conditions. It shall completely blank
out when not energized. No phantom legend shall be seen under any
ambient light condition. The housing shall be durable and weatherproof.
The sign face shall consist of fiber–optic glass bundles arranged to
define the legend. The fiber–optic modules and associated components
shall be assembled directly to the sign face and shall have an inside
back cover to provide protection for the module. The fiber–optic
bundles shall be ground smooth and optically polished at the input and
output ends for maximum light transmission. The sign shall be lit by 42
Watt lamps operating at 10.8 volts AC. The lamps shall sustain an
average 8,000 hour life. Transformers shall be used to reduce the
incoming 120 volts AC to 10.8 volts AC. The transformers shall contain
Class A insulation and weatherproofing, and shall be rated at 48.5 volt–
amps. The sign shall be capable of continuous operation over a range
in temperatures from –37 degrees to +74 degrees Celsius.

3.2.24.ENTRANCE HEAD. The entrance head shall be of cast aluminum
and shall be of the clamp–on type for use with rigid conduit of the
specified in the Plans. It shall be U.L. listed.

3.2.25.SERVICE ENCLOSURE. The service enclosure shall be watertight,
and be of sufficient size and load rating to provide the number of
circuits indicated in the Plans. The enclosure shall be provided with a
hasp for a padlock. Padlocks will be provided by others.

3.2.26.CIRCUIT BREAKERS. The circuit breakers shall be standard plug–
in, single pole, molded case, of the trip rating as shown in the Plans.

3.2.27.GROUND ROD. The ground rod shall be 19 mm diameter by
3 m long copper bonded steel rod and bear the U.L. label.

3.2.28.GROUND ROD CLAMP. The ground rod clamp shall be a 19 mm
clamp cast of high strength copper alloy and be U.L. listed for direct
burial.

3.2.29.SERVICE WIRE. The service wire shall be Type USE–2 standard,
annealed, copper wire meeting the requirements of A.S.T.M. B–8, and
be of the size specified in the Plans.

3.2.30.LIGHTING DISTRIBUTION WIRE. The lighting distribution wire shall
be Type USE–2 stranded, annealed, copper wire meeting the requirements
of A.S.T.M. B–8, and be of the size specified in the Plans.

3.2.31.POLE & BRACKET WIRE. The pole and bracket wire shall be
Type USE–2 stranded, annealed, copper wire meeting the requirements
of A.S.T.M. B–8, and be of the size specified in the Plans.

3.2.32.GROUND WIRE. The ground wire shall be No. 6 AWG solid bare
copper wire meeting the requirements of A.S.T.M. B–3.

3.2.33.MULTICONDUCTOR CABLE. The multiconductor cable shall meet
the requirements of IMSA 19–1 or IMSA 20–1. Conductors shall be
stranded No. 14 AWG. The number of conductors shall be as indicated
in the Plans.

3.2.34.SHIELDED DETECTOR LEAD–IN CABLE. Shielded detector lead–in
cable shall meet the requirements of IMSA 50–2. Conductors shall be
No. 14 AWG.

3.2.35.DETECTOR LOOP WIRE. The detector loop wire shall meet the
requirements of IMSA 51–5. The conductor shall be No. 14 AWG, and the
tube shall be of polyethylene.

3.2.36.LOOP SEALANT. The loop sealant shall be a one–part polyurethane,
moisture curing, elastomeric compound requiring no mixing, measuring,
or application of heat prior to or during application. It shall be specifically
designed for sealing and protecting detector loop wires in both asphalt
and concrete pavements. It shall not chemically attack or damage the
pavement, yet shall sufficiently bond with the pavement to effectively
seal the saw cut and prevent the infiltration of moisture into the slot.
The cured loop sealant shall exhibit resistance to the normally
encountered effects of weather, vehicular abrasion, motor oils, gasoline,

antifreeze solution, brake fluid, deicing chemicals and salt in such
manner that the performance of the detector loop is not adversely
affected. The loop sealant shall provide compressive yield strength to
withstand normal vehicular traffic and prevent the intrusion of rocks,
glass, and other road debris into the slot. It shall remain sufficiently
flexible at all normally encountered temperatures to withstand normal
movement in asphalt and concrete pavements while protecting the loop
wire from fracture and shear.

3.2.37.PRE–FORMED LOOPS. Pre–formed loops shall be factory
assembled loops having the dimensions and number of turns of wire
specified in the Plans. The loops shall be constructed of a minimum
No. 16 AWG Type TFFN/THWN copper wire meeting the requirements
of A.S.T.M. B–8, and encased in heavy duty tubing compatible with the
paving material being used on the project. The tubing shall be completely
filled with asphalt sealant material after the wire is installed. The loop
tail shall be of flexible tubing of the length specified in the Plans and
shall also be filled with asphalt sealant material. The detector wire within
the loop tail shall be twisted a minimum of 10 turns per meter.

3.2.38.CONDUIT.

3.2.38.1.METALLIC CONDUIT AND FITTINGS. Metallic conduit shall be
galvanized rigid steel conduit meeting the requirements of A.N.S.I.
C80.1. Metallic conduit fittings shall be zinc coated and shall meet
the requirements of A.N.S.I. C80.4.

3.2.38.2. PVC CONDUIT AND FITTINGS. PVC conduit shall be either
Schedule 40 or Schedule 80 rigid polyvinyl chloride meeting the
requirements of the latest edition of N.E.M.A. Standard TC–2. PVC
conduit fittings shall meet the requirements of N.E.M.A. Standard
TC–3 and shall be fabricated from polyvinyl chloride having the
same chemical and physical properties as the conduit with which it is
to be used. The conduit and fittings shall bear the U.L. label.

3.2.38.3. POLYETHYLENE CONDUITPolyethylene conduit shall be
coilable, smooth wall, Schedule 40 or Schedule 80, high density
polyethylene duct meeting the requirements of N.E.M.A. Standard
TC–7.

3.2.39.EXPANSION FITTINGS. Expansion fittings shall be as detailed in
the Plans.

3.3. BASIS OF ACCEPTANCE. Acceptance of materials furnished under
these specifications will be based upon the following:

3.3.1. PRE–QUALIFICATION. The Bureau of Traffic Engineering maintains
a list of Pre–Qualified Traffic Signal Materials. Any product called for in
the Bill of Materials in the Plans that is being furnished for the project
must be on that list, or must be approved as noted in Section 3.3.2.1
of these specifications. A manufacturer or supplier intending to supply
traffic signal materials under these specifications shall submit an original
copy of any catalog cuts, shop drawings, drawings, and/or data sheets
on the material, and certification from the manufacturer or fabricator
certifying that the material meets the applicable specifications. This
information shall be submitted to the Bureau of Traffic Engineering,
217 SE 4th Street, 4th Floor, Topeka, KS 66603–3504.

3.3.2. TRAFFIC SIGNAL MATERIALS LIST. Items on the list shall include all
items for which quantities are indicated in the Bill of Materials in the
Plans. The list shall include the make, model and other descriptive data
as may be required by the Engineer to identify the product. The
Contractor shall sign the list certifying that the materials on the
list, if approved, will be furnished for the project. The Engineer wil
compare the items on the Traffic Signal Materials List to the Pre–
Qualified Traffic Signal Materials List. If all of the items match, the
Engineer will sign the list attesting that the materials are approved
for use on the project. A copy of the list shall then be forwarded
to each of the following: Chief of Materials and Research, Chief
of Traffic Engineering, and the Maintaining Agency's contact person
indicated in the Plans.

3.3.2.1. In the event the Contractor wishes to furnish any item that
is not on the pre–qualified list, the Contractor shall furnish the
Engineer with the information for pre–qualification per Section 3.3.1
of these specifications. This information will be forwarded to the
Bureau of Traffic Engineering for review and approval, and the
possible addition to the pre–qualified list.

3.3.3. VISUAL INSPECTION. Items will be visually inspected by the
Engineer at the job site for condition and conformance with the
requirements of these specifications.

3.3.4. ADDITIONAL REQUIREMENTS. There are additional requirements
noted for specific items under Section 3.2. of these specifications.

FHWA REGION NO.	STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
7	KANSAS	87N–0080–01	1997	104	162

3				
2				
1				
NO.	DATE		BY	APP'D

KANSAS DEPARTMENT OF TRANSPORTATION

TRAFFIC SIGNAL
SPECIFICATIONS

TE120DSI04/28/98

FHWA APPROVAL	05/18/98	APP'D	Linda G. Voss, P.E.
DESIGNED	J.F.F.	DETAILED	J.F.F.
DESIGN CK.	D.A.C.	DETAIL CK.	D.A.C.
		QUANTITIES	QUAN. CK.
		TRACED	TRACE CK.