
DATE: December 7, 2021
TO: Paul Zachary, Engineering Services Department Director
FROM: Henry Som de Cerff, Design Manager
SUBJECT: Standards and Specifications for Section 614 – LED Traffic Signal Heads and Pedestrian Signal Heads
Approved by Committee: August 10, 2021

The Specification Review Committee recommends and asks the Engineering Services Department Director to approve the following:

1. Modify Section 614 – LED Traffic Signal Heads and Pedestrian Signal Heads

Please call me at (918) 596-7355 if you have any questions.

Thank you.

APPROVED:

For 

Paul Zachary, Director

12.28.21

Date

Cc: Engineering Services Department Specification Review Committee

DIVISION VI

TRAFFIC SPECIFICATIONS – MATERIALS

PART 614 – LED TRAFFIC SIGNAL HEADS AND PEDESTRIAN SIGNAL HEADS

614.1 GENERAL

614.1.1 This item shall consist of providing and installing Light Emitting Diode (LED) traffic signal heads and LED pedestrian signal heads on various types of supports at locations shown on the Plans and in conformance with these specifications and the Institute of Transportation Engineers (ITE) Standard Specifications.

614.2 MATERIALS

614.2.1 Approved Products List: All materials provided shall be supplied per the approved materials listed on the City of Tulsa Traffic Operations Approved Products List.

614.2.2 General: The traffic signal heads and all component parts shall be in compliance with the requirements contained in this specification and the standards contained in the publication No. ST-017, *Equipment and Material Standards of the Institute of Transportation Engineers*.

614.2.3 Housing:

- A) Traffic signal head housing shall be fabricated from a one-piece engineering plastic equal in strength and performance to polycarbonate resin material with LED Indications.
- B) All Acrylonitrile-Butadiene-Styrene (ABS) sheet material shall be UV stabilized.
- C) The sides, top and bottom of each head section shall be integrally molded.
- D) The traffic signal head shall consist of the number of sections and the lens configuration(s) specified in the Plans. The heads shall be designed for vertical installation.
- E) The sections shall be designed so that they can be locked in position in increments not exceeding 5° of rotation. The individual sections shall be fastened together by means of bolts extending through each section and shall be positively locked when the bolts are tightened down. When assembled, together with doors, LEDs, and mounting attachments the housing shall be completely dust and moisture proof.
- F) The top and bottom of each section shall be provided with an opening to accommodate standard 1-1/2" pipe brackets. Any open end of an assembled traffic signal head shall be plugged with a pinnacle cap and gasket. Any other unused openings shall be made watertight by a method approved by the Traffic Engineer.

- G) All bolts, nuts, washers, and other hardware used for securing the signal head sections shall be completely rust proof.
- H) Traffic Signal Backplates shall be aluminum with a durable factory applied non-reflective black finish (powder coated, baked enamel, or other finish as approved by the traffic engineer.) Backplates shall be a minimum thickness of 0.05" and shall have louvers. At the front side of the backplate a 2" wide strip of fluorescent yellow retro-reflective tape shall be installed at the perimeter. The retro-reflective tape shall be Type XI.
- I) All 5-section heads top and bottom backplate butt joints shall have a minimum of two screw and clip nuts per joint, a minimum of one is required for 3-section heads and 4-section heads.
- J) All 5-section cluster signal backplates must be reinforced with a minimum of a 5/8" flange on all sides.
- K) Each traffic signal vehicle section shall have four appropriately sized stainless-steel washers and fasteners.
- L) Traffic signal heads and visors shall have the appropriate color completely impregnated in the resin material. The exterior shall be Federal Yellow in color and the interior surface of all visors shall have a flat black finish.

614.2.4 Traffic Signal Doors:

- A) Each signal lens shall be mounted in a door fabricated of the same material as the housing. The doors shall be suitably hinged and shall be latched with a latch bolt of the adjustable pressure type. Hinges shall be located to the left side for 3-section signal heads and 4-section signal heads, and toward the outside edges for a 5-section signal head. The outer face of the door shall have at least four tapped holes equally spaced around the lens opening to receive the screws, which hold the visor in place.
- B) Each door shall be provided with a visor approximately 12" in length. Traffic signal head visors shall be the tunnel type. All visors shall be fabricated of the same material as the head sections.
- C) Neoprene or superior material shall be provided for gasketing between the body of the housing and the doors, to exclude dust and moisture.

614.2.5 Pedestrian Signal Heads:

- A) Pedestrian signal heads shall be Single-Section with LED indications.
- B) Single-Section design shall be provided with a band type mounting bracket for each signal head. The pole half of the assembly shall not weigh more than 44 ounces

and shall be designed to adapt to a wide range of pole configurations (4" minimum diameter).

- C) The mounting hardware shall be a two piece, cast aluminum alloy assembly. The two separate casting shall be joined in the final assembly by the use of stainless-steel spring pins. The spring pins shall be factory installed into the hinge ears which shall be integrally cast into the pole half of the assembly. Final mating of the two halves shall be accomplished by inserting the spring pins into the drilled hinge ears of the head half of the assembly (loose fit).
- D) Band type mounting shall be provided by integrally casting two recessed slots near the top and bottom of the pole half of the assembly. The corners of this slot shall be relieved to prevent damage to the band strapping material. Approximate dimensions of each slot shall be 7/8" wide and 1/8" deep thus adequately retaining 3/4" strapping material.
- E) Lenses shall be rectangular with a nominal size of 16", as specified in the Plans. Lens design shall conform to the provisions of the latest edition of the standard "Pedestrian Traffic Control Signal Indications" from ITE publication ST-17 and the Manual on Uniform Traffic Control Devices.
- F) Single-Section pedestrian heads shall be equipped with egg crate visors.
- G) Pedestrian signal heads shall conform to the applicable requirements contained herein for traffic signal heads.
- H) The pedestrian traffic control signal indications shall use the international symbols.
- I) The pedestrian signal indications furnished shall include countdown timers.
- J) Pedestrian signal heads and visors shall be flat black.

614.2.6 LED Units:

- A) Provide LED lamps in accordance with the most recent version of the ITE standard "*Vehicle Traffic Control Signal Heads*" (VTCSH) and "*Pedestrian Traffic Control Signal Indications*" (PTCSI). Unless otherwise shown on the plans.
- B) Lenses shall be of hard coated and UV stabilized polycarbonate design to provide color and light output as specified in Section 8.04 and Figure 1 of the VTCSH standard. Lenses shall be securely mounted in the door with weatherproof gaskets and rust proof clips.
- C) The LED signals shall not be the screw-in type.
- D) The LED signal shall be marked "TOP" to designate the proper orientation of the LED unit in the traffic signal housing manufacturer part number, and date code shall be visible on the rear of the assembly.

- E) The colors of the LED traffic modules shall conform to the chromaticity requirements of Section 8.04 and Figure 1 of the VTCSH standard.
- F) Traffic and pedestrian signal indications shall fail catastrophically. Pixelated LED indications shall not be accepted.
- G) The LEDs shall operate over the voltage range of 92 VAC to 125 VAC.
- H) The variation in line voltage shall not cause the light to vary more than 30%
- I) Arrow lenses shall conform to Section 9.00 of ITE publication ST-017. Lenses shall be of hard coated and UV stabilized polycarbonate with the arrow mask inserted in the lens.
- J) The LED unit shall utilize the same mounting hardware used to secure an incandescent lens and gasket assembly and only require a screwdriver complete the mounting.

614.2.7 Wiring:

- A) The leads on the LED signal module shall be 36" long made of 20 AWG 600-volt Opticom or approved cable able to withstand temperatures of at 75° C. Use UV rated cable ties to secure excess wire and cable.
- B) The leads shall be strain relieved and have fully insulated quick disconnect female (spade) couplers.
- C) Each LED Unit shall be provided with two color coded wires. These wires shall be a minimum of 18-gauge copper. The color coding shall be as follows:
 - 1) Brown – Green or Green Arrow
 - 2) White – Common (Grounded side of power)
 - 3) Red – Red, Red Arrow
 - 4) Yellow – Yellow or Yellow Left or Right Arrow
 - 5) Green – Green, Green Arrow
 - 6) Blue – Walk
 - 7) Orange – Don't Walk
- D) The leads shall be securely fastened to the LED module and connected to a terminal block by means of solderless wire connectors. The leads shall be long enough to reach the terminal block in each of the head sections.

- E) A terminal block shall be positioned in the appropriate section of the signal head and shall have a screw terminal for each wire from the LED module and separate terminal for each field wire. See City of Tulsa Standard Drawing 615 for more details. The terminal blocks shall be mounted vertically or horizontally.

614.3 CONSTRUCTION METHODS

- A) Make each signal head weathertight.
- B) A signal head may consist of one or more signal sections of the adjustable, LED type, with multiple signal section rigidly and securely fastened together.
- C) Each signal section shall be a self-contained assembly consisting of an LED unit with housing, housing door, visor and backplate unless otherwise specified on the Plans.
- D) Supply signal heads with all brackets and fittings necessary for proper mounting on the type signal support designated on the Plans and make them capable of being positively positioned to control the movement of one direction of traffic.

614.4 METHOD OF MEASUREMENT

The traffic signal heads and lamps will be measured by the unit, complete in place, including wiring and all hardware. The backplates and visors will be included in this pay item.

614.5 BASIS OF PAYMENT

The accepted traffic signal and pedestrian heads with backplates, visors and LEDs, and all materials, labor, equipment, and incidentals necessary to complete the work as specified will be paid for at the contract unit price as follows:

- A) LED 3-Section Traffic Signal Head (#25).....EACH
- B) LED 3-Section Traffic Signal Head (#33).....EACH
- C) LED 3-Section Traffic Signal Head (#36).....EACH
- D) LED 3-Section Traffic Signal Head (#36) (Louvered).....EACH
- E) LED 3-Section Traffic Signal Head (#37).....EACH
- F) LED 3-Section Traffic Signal Head (#54L).....EACH
- G) LED 3-Section Traffic Signal Head (#54L) (Louvered).....EACH
- H) LED 3-Section Traffic Signal Head (#54R).....EACH

I) LED 3-Section Traffic Signal Head (#54R) (Louvered).....EACH

J) LED 3-Section Traffic Signal Head (#64R).....EACH

K) LED 3-Section Traffic Signal Head (#64L).....EACH

L) LED 4-Section Traffic Signal Head (S-13L).....EACH

M) LED 4-Section Traffic Signal Head (S-13L) (Louvered).....EACH

Such payment shall be full compensation for furnishing materials, labor, equipment, and incidentals necessary to complete the work as specified.